Endocrinology

Thyroid Disorders

1. **Hashimoto's thyroiditis** is the most common cause of hypothyroidism in the US. Labs: **↑ TSH, ↓ T4**, positive anti-thyroperoxidase (TPO) and anti-thyroglobulin antibodies.
2. **Graves' disease** is the most common cause of hyperthyroidism. Classic triad: hyperthyroidism, **exophthalmos**, and **pretibial myxedema**. Labs: **↓ TSH, ↑ T4**, positive TSH receptor antibodies (TRAb).
3. **Subacute (De Quervain's) thyroiditis** presents with a painful, tender thyroid gland and a triphasic course: hyperthyroidism → hypothyroidism → recovery. It is often preceded by a viral URI.
4. **Amiodarone** can cause both hyperthyroidism (Type I in iodine-deficient areas, Type II from destructive thyroiditis) and hypothyroidism.
5. **Thyroid Storm** is a life-threatening exacerbation of hyperthyroidism. Precipitated by stress (e.g., infection, surgery). Treat with **Beta-blockers (first line for symptoms), PTU (preferred over methimazole as it blocks peripheral conversion), Iodine, and Steroids**.
6. **Myxedema coma** is a life-threatening exacerbation of hypothyroidism. Precipitated by cold exposure, infection. Key findings: hypothermia, bradycardia, hypoventilation, and altered mental status. Treat with **IV Levothyroxine and IV Glucocorticoids** (until concomitant adrenal insufficiency is ruled out).

Adrenal Disorders

7. **Primary Adrenal Insufficiency (Addison's disease)** presents with weakness, weight loss, **hyperpigmentation**, **hyponatremia**, and **hyperkalemia**. The most common cause in the US is **autoimmune**.
8. The **ACTH stimulation (cosyntropin) test** is the definitive test for adrenal insufficiency. No cortisol response confirms the diagnosis.
9. **Cushing's syndrome** is most commonly **iatrogenic** from exogenous glucocorticoid administration. The most common *endogenous* cause is **Cushing's disease** (pituitary ACTH-secreting adenoma).
10. **Primary Hyperaldosteronism (Conn's syndrome)** presents with **hypertension and hypokalemia**. Labs show **suppressed plasma renin** and elevated aldosterone. The most common cause is a unilateral adrenal adenoma.

11. The initial test for suspected primary hyperaldosteronism is the **aldosterone-to-renin ratio (ARR)**, which will be high.
12. **Pheochromocytoma** classically presents with the **5 P's**: **P**ressure (paroxysmal hypertension), **P**ain (headache), **P**alpitations, **P**allor, and **D**iaphoresis (**P**erspiration). Rule of 10s: 10% bilateral, 10% extra-adrenal, 10% malignant, 10% familial.
13. **Pre-operative management for pheochromocytoma** requires **alpha-blockade (phenoxybenzamine) FIRST**, followed by beta-blockade. Giving a beta-blocker first can lead to unopposed alpha-stimulation and a hypertensive crisis.
14. **Congenital Adrenal Hyperplasia (CAH)** is most commonly caused by **21-hydroxylase deficiency**. This leads to **↑ 17-hydroxyprogesterone**, shunting of precursors to the androgen pathway (causing virilization), and aldosterone deficiency (causing salt-wasting).

Diabetes & Glucose Metabolism

15. **Diabetic Ketoacidosis (DKA)** key labs: hyperglycemia (usually >250), **high anion gap metabolic acidosis**, ketonemia/ketonuria. The main treatment is **IV fluids, IV insulin, and potassium repletion**.
16. **Hyperosmolar Hyperglycemic State (HHS)** is characterized by extreme hyperglycemia (>600), hyperosmolality, and dehydration **without significant ketoacidosis**. It has a higher mortality than DKA.
17. **Metformin** is a first-line treatment for Type 2 Diabetes. Its rare but serious side effect is **lactic acidosis**, which is more likely in patients with renal impairment, CHF, or liver disease.
18. **SGLT2 inhibitors** (e.g., canagliflozin) cause glucosuria. Side effects include genitourinary infections and a risk of **euglycemic DKA**.
19. The general goal for **HbA1c in non-pregnant adults** with diabetes is **<7.0%** to prevent microvascular complications.
20. **Hypoglycemia** in a diabetic patient is most often due to insulin or sulfonylurea use. Immediate treatment is glucose administration. For unconscious patients, give **glucagon** IM.

Calcium & Bone Metabolism

21. **Primary Hyperparathyroidism** is the most common cause of hypercalcemia in the outpatient setting. It is often caused by a single parathyroid adenoma. Classic

presentation: "**Stones, Bones, Groans, and Psychiatric Overtones**" (kidney stones, bone pain, constipation/abdominal pain, depression/confusion).

22. **Hypercalcemia of malignancy** is the most common cause of hypercalcemia in the *inpatient* setting, often due to **PTHrP** secretion by tumors (e.g., squamous cell lung CA, breast CA).
23. **Hypoparathyroidism** most commonly occurs after **anterior neck surgery** (e.g., thyroidectomy). Labs: **↓ Ca^{2+}, ↑ Phosphate, ↓ PTH**. Acute symptoms include perioral numbness, paresthesias, and tetany. Treat with Calcium and Vitamin D.
24. **Chvostek's sign** (facial twitching upon tapping the facial nerve) and **Trousseau's sign** (carpopedal spasm with blood pressure cuff inflation) are signs of hypocalcemia.
25. **Paget's Disease of Bone** is a disorder of excessive bone breakdown and formation, leading to deformed, fragile bones. Labs: **Markedly elevated Alkaline Phosphatase**. Symptoms include bone pain, hearing loss, and "hat doesn't fit" from skull enlargement.

Pituitary & Hypothalamus

26. **Prolactinoma** is the most common *functional* pituitary adenoma. It presents with **galactorrhea** and **hypogonadism** (amenorrhea in women, low libido/impotence in men).
27. Large pituitary tumors (>1 cm, macroadenomas) can cause **bitemporal hemianopia** due to compression of the **optic chiasm**.
28. **Acromegaly** is caused by excessive **GH** in adulthood, usually from a pituitary adenoma. Clinical features: coarse facial features, enlarged hands/feet, macroglossia, carpal tunnel syndrome. Diagnosis: **Elevated IGF-1**, failure to suppress GH on an oral glucose tolerance test.
29. **Diabetes Insipidus (DI)** is characterized by the production of large volumes of dilute urine. **Central DI** is due to a lack of ADH; **Nephrogenic DI** is due to renal resistance to ADH.
30. The **Water Deprivation Test** is used to differentiate DI from primary polydipsia and to distinguish central from nephrogenic DI.
31. **SIADH** is a common cause of **euvolemic hyponatremia**. Labs: ↓ plasma osmolality, ↑ urine osmolality, ↑ urine sodium. Common causes: malignancy (lung cancer), CNS disorders, pulmonary disease, and drugs.

Syndromes & Misc.

32. **MEN 1 (Wermer's syndrome)**: "**3 P's**" – **P**arathyroid adenoma (most common), **P**ituitary adenoma, **P**ancreatic neuroendocrine tumors (e.g., gastrinoma, insulinoma).
33. **MEN 2A (Sipple syndrome)**: Medullary Thyroid Carcinoma, **Pheochromocytoma**, **Primary Hyperparathyroidism**.
34. **MEN 2B**: Medullary Thyroid Carcinoma, Pheochromocytoma, **Mucosal Neuromas**, Marfanoid habitus. It is the most aggressive form of MEN.
35. **Lithium** is a common cause of **Nephrogenic Diabetes Insipidus**.
36. **SIADH** is a common complication of **small cell lung cancer**.
37. The most common cause of **gynecomastia** in an adolescent is **physiologic pubertal gynecomastia**. In an adult, think of drugs (spironolactone, finasteride), cirrhosis, or testicular tumors.
38. **Hyperprolactinemia** can cause hypogonadism because prolactin inhibits **GnRH** release from the hypothalamus.
39. **Testicular feminization (Androgen Insensitivity Syndrome)** presents in a genetic male (46, XY) with female external genitalia, primary amenorrhea, and **absent pubic/axillary hair**. Testes are often present inguinally/abdominally.
40. **5-alpha-reductase deficiency** presents in genetic males (46, XY) with ambiguous genitalia at birth but significant virilization at puberty.

Key Diagnostic Labs & Findings

41. **Low T3, Low T4, Low TSH** = **Secondary (pituitary) or Tertiary (hypothalamic) Hypothyroidism**.
42. **High TSH, Low T4** = **Primary Hypothyroidism**.
43. **Low TSH, High T4** = **Primary Hyperthyroidism**.
44. **Hyponatremia + Hyperkalemia** = Think **mineralocorticoid deficiency** (e.g., Addison's disease, hypoaldosteronism).
45. **Hypokalemia + Metabolic Alkalosis + Hypertension** = Think **mineralocorticoid excess** (e.g., Conn's syndrome).
46. **Hypoglycemia + Hypokalemia + Metabolic Alkalosis** = Suggestive of **insulinoma** (Whipple's Triad confirms the diagnosis).
47. A **high ACTH** in Cushing's syndrome suggests a pituitary or ectopic source. A **low ACTH** suggests an adrenal source.
48. A **high PTH** in the setting of hypercalcemia confirms **primary hyperparathyroidism**. A **low PTH** suggests a non-parathyroid cause (e.g., malignancy).

49. **Hypercalcemia + Low PTH** = Likely **PTHrP** from malignancy.
50. **Elevated 24-hour urinary free cortisol** or an **abnormal overnight dexamethasone suppression test** are initial tests for Cushing's syndrome. The **high-dose dexamethasone suppression test** helps differentiate a pituitary source (suppresses) from an ectopic/adrenal source (no suppression).

Cardiology

Ischemic Heart Disease & Acute Coronary Syndromes (ACS)

1. **Stable Angina** is characterized by substernal chest pain precipitated by exertion or stress and relieved by rest or nitroglycerin. It is caused by fixed atherosclerotic plaque.
2. **Unstable Angina/NSTEMI** represent a spectrum of **Non-ST-Elevation Acute Coronary Syndromes (NSTE-ACS)**. They are caused by a ruptured plaque with a non-occlusive thrombus. ECG may show ST depression or T-wave inversion.
3. **STEMI** is caused by complete, **occlusive thrombosis** of a coronary artery. The ECG shows **ST-segment elevation** in the leads corresponding to the infarct area.
4. The initial management for a **STEMI** is immediate **reperfusion therapy**: either **Primary PCI** (Percutaneous Coronary Intervention) or **Fibrinolytic therapy** (if PCI is not available within 90-120 minutes).
5. The initial management for **NSTEMI/Unstable Angina** is **medical stabilization** with dual antiplatelet therapy (DAPT: Aspirin + P2Y12 inhibitor like Clopidogrel) and an anticoagulant, followed by **risk stratification** to decide on invasive vs. conservative management.
6. **Killip Classification** is used to risk-stratify patients post-MI based on clinical signs of heart failure. Class I (no HF) has the best prognosis, Class IV (cardiogenic shock) has the worst.
7. **Right Ventricular (RV) Infarction** is most commonly associated with an **inferior wall MI**. Classic triad: **Jugular Venous Distention (JVD), Kussmaul's sign, and clear lungs**. Treat with **IV fluids** to maintain preload; avoid nitrates and diuretics.
8. **Post-MI Pericarditis** typically presents 2-3 days after an MI with pleuritic chest pain and a **friction rub**. ECG may show diffuse, saddle-shaped ST elevation. Treat with high-dose **Aspirin** or NSAIDs.
9. **Dressler's Syndrome** is an autoimmune pericarditis that occurs **weeks to months** after an MI, characterized by fever, pericarditis, and pleuritis.

Heart Failure & Cardiomyopathy

10. **Systolic Heart Failure (HFrEF)** is characterized by a reduced **Ejection Fraction (EF <40%)**. Key compensatory mechanisms are the **Renin-Angiotensin-Aldosterone System (RAAS)** and the **Sympathetic Nervous System**.
11. First-line pharmacotherapy for **chronic HFrEF** includes **Beta-Blockers** (e.g., Metoprolol, Carvedilol) and **ACE Inhibitors** (or ARBs). For persistent symptoms, add an **Aldosterone Antagonist** (e.g., Spironolactone) and an **SGLT2 inhibitor**.
12. **Digoxin** is used in HFrEF for symptomatic benefit; it **does not reduce mortality**. It works by inhibiting the Na+/K+ ATPase pump. Toxicity is worsened by **hypokalemia**.
13. **Acute Decompensated Heart Failure (ADHF)** often presents with pulmonary edema. Initial management includes **loop diuretics** (e.g., Furosemide) and **afterload reduction** with nitrates.
14. **BNP (B-type Natriuretic Peptide)** and **NT-proBNP** are released from ventricular myocytes in response to stretch and are key biomarkers for diagnosing heart failure.
15. **Diastolic Heart Failure (HFpEF)** is heart failure with a **preserved Ejection Fraction (EF >50%)**. It is commonly caused by hypertension and left ventricular hypertrophy. Diagnosis is often one of exclusion.
16. **Dilated Cardiomyopathy (DCM)** is characterized by systolic dysfunction and a dilated, hypokinetic left ventricle. The most common cause globally is **ischemic heart disease**; the most common *non-ischemic* cause is **idiopathic**.
17. **Hypertrophic Cardiomyopathy (HCM)** is an **autosomal dominant** condition often caused by mutations in sarcomere proteins (e.g., **MYH7, MYBPC3**). It presents with **asymmetric septal hypertrophy** and dynamic outflow tract obstruction.
18. Maneuvers that **increase** obstruction in HCM (worsen murmur): **Valsalva, standing**. Maneuvers that **decrease** obstruction (soften murmur): **handgrip, squatting**.
19. **Restrictive Cardiomyopathy** is characterized by **impaired ventricular filling** due to stiff, non-compliant ventricles. Causes include amyloidosis, sarcoidosis, and hemochromatosis. It mimics constrictive pericarditis.

Valvular Heart Disease

20. **Aortic Stenosis (AS)** classic triad: **Syncope, Angina, and Heart Failure (dyspnea)**. The murmur is a harsh, **crescendo-decrescendo systolic murmur** that radiates to the carotids.
21. The most common cause of **Aortic Stenosis** in patients <70 is a **congenital bicuspid aortic valve**. In patients >70, it is **senile calcific degeneration**.

22. **Mitral Stenosis (MS)** is most commonly caused by **rheumatic heart disease**. The classic murmur is a **low-pitched, rumbling diastolic murmur with an opening snap**.
23. **Mitral Regurgitation (MR)** presents with a **holosystolic, blowing murmur** that radiates to the axilla. Acute MR (e.g., from papillary muscle rupture post-MI) is a surgical emergency.
24. **Aortic Regurgitation (AR)** causes a **high-pitched, decrescendo diastolic murmur**. Chronic AR leads to a **wide pulse pressure**, seen as bounding "water-hammer" pulses and Quincke's sign (nail bed pulsations).
25. **Mitral Valve Prolapse (MVP)** is often asymptomatic. The classic finding is a **mid-systolic click** followed by a late systolic murmur if regurgitation is present. It is worsened by maneuvers that decrease preload (e.g., Valsalva, standing).

Arrhythmias & Conduction Defects

26. **Atrial Fibrillation** is characterized by an **irregularly irregular rhythm** and the absence of P waves on ECG. The two major management goals are: **Rate control** (Beta-blockers, non-DHP CCBs like Diltiazem) and **Stroke prevention** (anticoagulation based on CHA_2DS_2-VASc score).
27. The **CHA_2DS_2-VASc score** is used to assess stroke risk in non-valvular AFib and guide anticoagulation. A score of ≥2 in men or ≥3 in women warrants anticoagulation.
28. **Wolff-Parkinson-White (WPW) Syndrome** is characterized by a **short PR interval** and a **delta wave** (slurred upstroke of QRS) on ECG due to an accessory pathway (Bundle of Kent).
29. **Acute management of WPW with AFib** involves avoiding AV nodal blockers (e.g., CCBs, Beta-blockers, Digoxin) as they can precipitate VF. The treatment of choice is **Procainamide** or **cardioversion**.
30. **Supraventricular Tachycardia (SVT)** often presents with a regular, narrow-complex tachycardia. First-line maneuver is **vagal stimulation** (e.g., Valsalva). First-line pharmacotherapy is **Adenosine**.
31. **Ventricular Tachycardia (VT)** is a wide-complex tachycardia. The presence of **AV dissociation** (e.g., capture beats, fusion beats) on ECG is diagnostic.
32. **Torsades de Pointes** is a polymorphic VT associated with a **prolonged QT interval**. Acute treatment is **IV Magnesium**. Common causes include medications (antiarrhythmics, antipsychotics) and electrolyte abnormalities (hypokalemia, hypomagnesemia, hypocalcemia).

33. **First-Degree AV Block** is a **prolonged PR interval (>200 ms)**. It is benign and requires no treatment.
34. **Mobitz Type I (Wenckebach)** is a progressive **lengthening of the PR interval** until a QRS complex is dropped. It is usually benign.
35. **Mobitz Type II** is a **sudden, non-conducted P wave** without PR interval prolongation. It often progresses to **Third-Degree (Complete) Heart Block** and requires a **pacemaker**.
36. **Third-Degree (Complete) Heart Block** shows **no relationship between P waves and QRS complexes** (AV dissociation). The escape rhythm determines the heart rate and symptoms. Treatment is a **permanent pacemaker**.

Pericardial Disease & Other Topics

37. **Cardiac Tamponade** is a medical emergency characterized by **Beck's Triad**: hypotension, JVD, and **muffled heart sounds**. The classic ECG finding is **electrical alternans**. Diagnosis is confirmed by echocardiogram. Treatment is **emergent pericardiocentesis**.
38. **Constrictive Pericarditis** results from a thickened, fibrotic pericardium restricting ventricular filling. It mimics restrictive cardiomyopathy. A **pericardial knock** may be heard. CT or MRI shows a thickened pericardium.
39. **Hypertension** is the most common modifiable risk factor for cardiovascular disease. First-line agents for uncomplicated hypertension are **Thiazide diuretics, ACE inhibitors/ARBs, or Dihydropyridine Calcium Channel Blockers**.
40. **Hypertensive Emergency** is defined as severe hypertension (>180/120 mmHg) with evidence of **end-organ damage** (e.g., encephalopathy, renal failure, papilledema). Treatment is with **IV agents** (e.g., Nicardipine, Labetalol, Nitroprusside) in a controlled setting.
41. **Infective Endocarditis (IE)** diagnosis is based on the **Modified Duke Criteria**. The most common cause of native valve IE in non-IV drug users is **Viridans group Streptococci**. In IV drug users, it is **S. aureus**.
42. **Osler nodes** (tender nodules on pads of fingers/toes), **Janeway lesions** (non-tender macules on palms/soles), and **Roth spots** (retinal hemorrhages) are classic peripheral signs of **Infective Endocarditis**.
43. **Hyperlipidemia** management is guided by the **ASCVD risk score**. For secondary prevention (patients with known ASCVD), high-intensity statin therapy is indicated regardless of LDL level.

44. **Coarctation of the Aorta** presents with **upper extremity hypertension** and **diminished/delayed femoral pulses**. A murmur may be heard over the scapulae. It is associated with **Turner syndrome** and a **bicuspid aortic valve**.
45. The most common congenital heart defect is a **Ventricular Septal Defect (VSD)**. The murmur is a **holosystolic murmur** heard best at the left lower sternal border.
46. **Patent Ductus Arteriosus (PDA)** causes a **continuous "machinery" murmur**. In utero, it is treated with **Indomethacin**. If it persists, it is closed surgically or via catheterization.
47. **Prinzmetal (Variant) Angina** is caused by coronary artery **vasospasm**, not atherosclerosis. It presents with chest pain **at rest**, and the ECG shows **transient ST-segment elevation**. Treated with **Calcium Channel Blockers**.
48. **Takotsubo (Stress) Cardiomyopathy** presents with acute chest pain and ECG changes mimicking an MI, often triggered by emotional or physical stress. Echo shows **apical ballooning** of the LV. Coronary angiography is normal.
49. **Deep Vein Thrombosis (DVT)** diagnosis is best made with **Doppler Ultrasound**. The **Wells' Criteria** are used to determine pre-test probability.
50. **Pulmonary Embolism (PE)** classic triad is **dyspnea, pleuritic chest pain, and hemoptysis** (though this is rare). The most common ECG finding is **sinus tachycardia**. An **S1Q3T3** pattern is classic but not common. Diagnosis is confirmed with **CT Pulmonary Angiography (CTPA)**.

Pulmonology

Obstructive Lung Diseases (Asthma, COPD, Bronchiectasis)

1. **Asthma** is a chronic inflammatory disorder of the airways characterized by **reversible** airflow obstruction, bronchial hyperresponsiveness, and mucus plugging. Diagnosis is confirmed with **spirometry showing an FEV1/FVC ratio <0.8 and ≥12% improvement in FEV1 after bronchodilator**.
2. The mainstay of long-term asthma control is **inhaled corticosteroids (ICS)**. **Short-acting beta-agonists (SABA)** like albuterol are used for quick relief of acute symptoms.
3. **Status Asthmaticus** is a severe, life-threatening asthma attack that does not respond to standard SABA therapy. Arterial Blood Gas (ABG) may initially show **respiratory alkalosis** but can progress to **respiratory acidosis** (a sign of impending respiratory failure).

4. **COPD** is characterized by **irreversible** or partially reversible airflow obstruction. The two main phenotypes are **chronic bronchitis** ("blue bloaters") and **emphysema** ("pink puffers").
5. **Chronic Bronchitis** is clinically defined as a **productive cough for at least 3 months in each of two consecutive years**. Pathophysiology involves hypertrophy of mucus glands and chronic inflammation.
6. **Emphysema** is characterized by **destruction of alveolar walls** and permanent enlargement of air spaces distal to the terminal bronchioles. The classic finding is **decreased diffusing capacity for carbon monoxide (DLCO)**.
7. The most significant risk factor for COPD is **tobacco smoking**. A rare genetic cause is **Alpha-1 Antitrypsin Deficiency**, which should be suspected in a young, non-smoker with emphysema with a basilar predominance on imaging.
8. First-line pharmacotherapy for stable COPD is a **SABA or SAMA**. For persistent symptoms, **Long-Acting Muscarinic Antagonists (LAMA)** are superior. **Long-Acting Beta-Agonists (LABA)** and **ICS** are added for more severe disease or frequent exacerbations.
9. **Bronchiectasis** is the permanent, abnormal dilation of bronchi due to chronic, recurrent infection and inflammation. The classic presentation is a **chronic productive cough with copious amounts of purulent sputum**.
10. The **most common cause of bronchiectasis worldwide is cystic fibrosis**. A classic finding on physical exam is **digital clubbing**.

Restrictive Lung Diseases

11. Restrictive lung diseases are characterized by **reduced lung volumes** (decreased TLC, FRC, RV). They are divided into **intrinsic** (lung parenchyma) and **extrinsic** (chest wall, neuromuscular) causes.
12. **Idiopathic Pulmonary Fibrosis (IPF)** is the most common idiopathic interstitial pneumonia. It presents with **progressive dyspnea**, **dry cough**, and **bibasilar, late inspiratory "velcro" crackles** on auscultation.
13. High-Resolution CT (HRCT) of the chest in IPF shows a **usual interstitial pneumonia (UIP) pattern**: **reticular opacities, honeycombing, and traction bronchiectasis**, predominantly in the **bases and subpleural regions**.
14. **Sarcoidosis** is a multisystem granulomatous disease of unknown cause. The classic finding is **bilateral hilar lymphadenopathy (BHL)** on chest X-ray. Diagnosis is often confirmed by **non-caseating granulomas** on biopsy.

15. Common extrapulmonary manifestations of sarcoidosis include **skin lesions (erythema nodosum)**, **ocular involvement (uveitis)**, and **hypercalcemia** (due to activated macrophages producing 1-alpha-hydroxylase).

Pleural Disease

16. **Pleural Effusion:** A **transudate** is caused by systemic factors that alter hydrostatic or oncotic pressure (e.g., CHF, cirrhosis, nephrotic syndrome). An **exudate** is caused by local lung disease (e.g., pneumonia, malignancy, TB).
17. **Light's Criteria** are used to distinguish exudative from transudative effusions. An effusion is exudative if **at least one** of the following is met:
    a. Pleural fluid protein / Serum protein > 0.5
    b. Pleural fluid LDH / Serum LDH > 0.6
    c. Pleural fluid LDH > 2/3 the upper limit of normal serum LDH
18. A **pneumothorax** is air in the pleural space. A **tension pneumothorax** is a medical emergency characterized by **hypotension, tracheal deviation away from the affected side, and absent breath sounds**. Treatment is **immediate needle decompression** in the 2nd intercostal space, midclavicular line, followed by chest tube placement.
19. **Primary Spontaneous Pneumothorax** typically occurs in **tall, thin, young males** due to rupture of apical blebs.

Pulmonary Infections

20. **Community-Acquired Pneumonia (CAP):** The most common bacterial cause overall is ***Streptococcus pneumoniae***. **Atypical" pneumonias** (e.g., *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, *Legionella*) often present with a more subacute course and extrapulmonary symptoms.
21. **CURB-65** is a severity score for CAP used to determine inpatient vs. outpatient management. Criteria: **C**onfusion, **U**remia (BUN >19 mg/dL), **R**espiratory rate ≥30, **B**P (SBP <90 or DBP ≤60), **Age** ≥**65**.
22. **Nosocomial Pneumonia: Hospital-Acquired Pneumonia (HAP)** occurs ≥48 hours after admission. **Ventilator-Associated Pneumonia (VAP)** occurs ≥48 hours after endotracheal intubation. Common pathogens include ***Pseudomonas aeruginosa***, MRSA, and Gram-negative rods.
23. **Tuberculosis (TB)** is caused by ***Mycobacterium tuberculosis***. **Primary TB** often presents as a **Ghon complex** (peripheral lung nodule + hilar lymph node).

Reactivation TB typically occurs in the **apical/posterior segments of the upper lobes**.

24. A **positive PPD (Tuberculin Skin Test)** or **IGRA** indicates exposure/latent infection, **not active disease**. Diagnosis of active TB is made by **sputum acid-fast bacilli (AFB) smear and culture**.

Pulmonary Vascular Disease

25. **Pulmonary Embolism (PE)** most commonly originates from **deep vein thrombosis (DVT)** in the proximal lower extremities. **Virchow's Triad** (stasis, hypercoagulability, endothelial injury) summarizes the risk factors.
26. The most common symptom of PE is **dyspnea**. The most common sign is **tachycardia**. The classic triad of dyspnea, pleuritic chest pain, and hemoptysis is rare.
27. The **Wells' Criteria** are used to determine the pre-test probability for PE. Initial test of choice is a **CT Pulmonary Angiogram (CTPA)**. In pregnancy, a **V/Q scan** is often preferred to reduce radiation to the breast.
28. The most common ECG finding in PE is **sinus tachycardia**. The classic **S1Q3T3** pattern (S wave in lead I, Q wave and T wave inversion in lead III) is suggestive but not common.
29. First-line treatment for hemodynamically stable PE is **therapeutic anticoagulation** (e.g., DOACs, LMWH). For **massive PE with hemodynamic instability**, **thrombolysis** is indicated.

Lung Cancer & Mediastinum

30. The **most common type of lung cancer overall is Adenocarcinoma**. It is the most common type in **women and non-smokers**, and often presents as a **peripheral nodule**.
31. **Squamous Cell Carcinoma** is strongly associated with smoking and tends to be **central**, often causing **obstruction and post-obstructive pneumonia**.
32. **Small Cell Lung Cancer** is a high-grade neuroendocrine tumor that is almost always associated with smoking. It is characterized by **rapid growth, early metastasis, and paraneoplastic syndromes**. It is typically **not treated with surgery** but is very responsive to initial **chemotherapy and radiation**.
33. **Superior Vena Cava (SVC) Syndrome** is most often caused by **lung cancer** (especially small cell) or lymphoma. It presents with facial and upper extremity swelling, dyspnea, and dilated neck and chest veins.

34. **Horner's Syndrome** (ptosis, miosis, anhidrosis) can be caused by a **Pancoast Tumor** (a lung cancer in the superior sulcus, often squamous cell or adenocarcinoma) invading the sympathetic chain.

Respiratory Physiology & Acid-Base

35. The **A-a gradient** is the difference between the alveolar (A) and arterial (a) partial pressure of oxygen. **A-a gradient = PAO_2 - PaO_2**. A **normal A-a gradient** suggests hypoventilation (e.g., opioid overdose). An **elevated A-a gradient** suggests a problem with gas exchange (e.g., PE, pneumonia, COPD).
36. **Hypoxemia** is a low level of oxygen in the blood. Its five physiologic causes are: **1. Low FiO_2, 2. Hypoventilation, 3. V/Q Mismatch** (most common cause), **4. Shunt, 5. Diffusion Abnormality**.
37. **Carbon Monoxide (CO) Poisoning** causes hypoxemia by reducing the oxygen-carrying capacity of hemoglobin. It presents with **headache, confusion, and cherry-red skin**. PaO_2 is normal, but **oxygen saturation is low**. Treatment is **100% FiO_2**; severe cases may require **hyperbaric oxygen**.
38. In a **mixed acid-base disorder**, the pH can be normal, but the $PaCO_2$ and HCO_3^- will be abnormal and move in **opposite directions**.

Miscellaneous High-Yield Facts

39. **Obstructive Sleep Apnea (OSA)** is characterized by recurrent episodes of apnea/hypopnea during sleep. The classic patient is an **obese male with loud snoring and daytime somnolence**. Diagnosis is made with a **polysomnography (sleep study)**.
40. **Cystic Fibrosis (CF)** is an autosomal recessive disorder caused by a mutation in the **CFTR gene** on chromosome 7, leading to defective chloride channels. This results in **thick, viscous secretions** in the lungs (leading to bronchiectasis and infections with *Pseudomonas* and *S. aureus*), pancreas (leading to malabsorption and diabetes), and other organs.
41. The **sweat chloride test** is the gold standard for diagnosing CF. A value **>60 mEq/L** is diagnostic.
42. **Acute Respiratory Distress Syndrome (ARDS)** is defined by the **Berlin Criteria**: acute onset, bilateral opacities on CXR, respiratory failure not fully explained by cardiac failure, and a **PaO_2/FiO_2 ratio ≤ 300**.

43. The cornerstone of management for ARDS is **lung-protective ventilation** using **low tidal volumes (6 mL/kg ideal body weight)** to prevent ventilator-induced lung injury.
44. **Pneumoconioses:**
    a. **Coal Worker's Pneumoconiosis**: Upper lobe fibrotic nodules, can progress to **Progressive Massive Fibrosis**.
    b. **Silicosis**: Increased risk of **TB**. X-ray shows **eggshell calcification of hilar lymph nodes**.
    c. **Asbestosis**: Causes **lower lobe-predominant interstitial fibrosis**. Associated with **pleural plaques** and **malignancies** (lung cancer, mesothelioma).
45. **Wegener's Granulomatosis (Granulomatosis with Polyangiitis)** is a ANCA-associated vasculitis (typically **c-ANCA/PR3-ANCA positive**) causing **necrotizing granulomatous inflammation** of the **upper/lower respiratory tract** and **glomerulonephritis**.
46. **Goodpasture's Syndrome** is an autoimmune disease characterized by **anti-GBM antibodies** leading to **rapidly progressive glomerulonephritis** and **diffuse alveolar hemorrhage**.
47. **Pulmonary Function Tests (PFTs) Interpretation:**
    a. **Obstructive Pattern**: **FEV1/FVC < 0.7**
    b. **Restrictive Pattern**: **FEV1/FVC > 0.7**, but **FVC is reduced**.
    c. **DLCO**: Low in emphysema, IPF; normal or high in asthma.
48. The **V/Q (Ventilation/Perfusion) scan** is the test of choice for diagnosing **chronic thromboembolic pulmonary hypertension (CTEPH)**.
49. **Primary Pulmonary Hypertension** is a diagnosis of exclusion, characterized by elevated pulmonary arterial pressure in the absence of a secondary cause. It is more common in **young women**.
50. **Methemoglobinemia** occurs when iron in hemoglobin is oxidized from the **ferrous (Fe^{2+})** to the **ferric (Fe^{3+})** state, which cannot bind oxygen. It is caused by certain drugs (e.g., dapsone, nitrates, benzocaine) and presents with **cyanosis and "chocolate-brown" blood** that does not become red with oxygenation. Treatment is **methylene blue**.

Rheumatology

Rheumatoid Arthritis (RA) & Juvenile Idiopathic Arthritis (JIA)

1. **Rheumatoid Arthritis (RA)** is a chronic, systemic **autoimmune** disorder characterized by **symmetrical inflammatory polyarthritis**, primarily affecting the **small joints of the hands and feet (MCPs, PIPs, MTPs)**.
2. The classic presentation of RA is **morning stiffness lasting >1 hour** that improves with activity.
3. Characteristic deformities in advanced RA include **Ulnar Deviation, Swan-Neck, and Boutonnière Deformities**.
4. **Rheumatoid Factor (RF)** is an IgM autoantibody against the Fc portion of IgG. It is present in about 70-80% of RA cases but is **not specific**.
5. **Anti-Citrullinated Protein Antibody (ACPA or anti-CCP)** is **more specific** for RA than RF and often appears earlier in the disease course.
6. Extra-articular manifestations of RA include **Rheumatoid Nodules** (subcutaneous, often over extensor surfaces), **Pleuritis, Pericarditis, Episcleritis, and Vasculitis**.
7. First-line disease-modifying antirheumatic drug (DMARD) therapy for RA is **Methotrexate**. Biologic agents like **TNF-alpha inhibitors** (e.g., adalimumab) are used for inadequate response.
8. **Felty's Syndrome** is the triad of **RA, Splenomegaly, and Neutropenia**.
9. **Caplan's Syndrome** is the combination of RA and pneumoconiosis (e.g., coal worker's lung), leading to large pulmonary nodules.
10. **Juvenile Idiopathic Arthritis (JIA)** is arthritis of unknown cause lasting >6 weeks in a child <16 years old. The **systemic (Still's disease)** subtype presents with **high spiking fevers, salmon-colored rash, and serositis**.

Seronegative Spondyloarthropathies

11. The **Seronegative Spondyloarthropathies** are a group of disorders characterized by **axial skeleton involvement (sacroiliitis, spondylitis), negative RF, association with HLA-B27, and enthesitis** (inflammation at tendon/ligament insertion into bone).
12. **Ankylosing Spondylitis (AS)** primarily affects the **axial skeleton**, leading to chronic back pain and morning stiffness that improves with exercise. The classic finding is the **"bamboo spine"** on X-ray due to syndesmophyte formation.

13. Over 90% of patients with AS are **HLA-B27 positive**. Extra-articular manifestations include **Acute Anterior Uveitis (most common), Aortitis (leading to aortic regurgitation), and apical lung fibrosis**.
14. **Reactive Arthritis** (formerly Reiter's Syndrome) is triggered by GI (e.g., *Campylobacter, Salmonella*) or GU (e.g., *Chlamydia trachomatis*) infections. The classic triad is **"Can't See, Can't Pee, Can't Climb a Tree"** (Conjunctivitis/Uveitis, Urethritis, Arthritis).
15. **Psoriatic Arthritis** can present with **asymmetric oligoarthritis, symmetric polyarthritis (RA-like), DIP joint predominance, arthritis mutilans, or spondylitis**. The presence of **dactylitis ("sausage digits")** and **nail pitting/onycholysis** are highly suggestive.
16. **Enteropathic Arthritis** is associated with **Inflammatory Bowel Disease (IBD - Crohn's and Ulcerative Colitis)**. The arthritis often flares with bowel disease activity.

Systemic Lupus Erythematosus (SLE)

17. **Systemic Lupus Erythematosus (SLE)** is a chronic, multisystem autoimmune disease characterized by the production of a wide array of **autoantibodies**.
18. The **ANA (Anti-Nuclear Antibody)** test is highly sensitive for SLE (>95%) but has low specificity. A negative ANA makes the diagnosis of SLE very unlikely.
19. **Anti-dsDNA** and **Anti-Smith (Anti-Sm)** antibodies are **highly specific** for SLE. Anti-dsDNA titers often correlate with disease activity, especially lupus nephritis.
20. The **ACR (American College of Rheumatology) criteria** require at least 4 of 11 features for diagnosis. High-yield ones include:
    a. **Malar Rash** (spares nasolabial folds)
    b. Discoid Rash
    c. Photosensitivity
    d. Oral/Nasopharyngeal Ulcers
    e. Arthritis
    f. **Serositis** (Pleuritis, Pericarditis)
    g. **Renal Disorder** (Lupus Nephritis)
    h. **Neurologic Disorder** (Seizures, Psychosis)
    i. **Hematologic Disorder** (Cytopenias)
21. **Lupus Nephritis** is a common and serious complication. The most common and severe form is **Diffuse Proliferative Glomerulonephritis (Class IV)**. Diagnosis requires a **renal biopsy**.

22. **Drug-Induced Lupus** is commonly caused by **Hydralazine, Procainamide, and Isoniazid**. It typically presents with fever, malaise, arthritis, and serositis. **Anti-Histone antibodies** are a classic serologic finding, and **renal and CNS involvement is rare**.

Scleroderma & Inflammatory Myopathies

23. **Systemic Sclerosis (Scleroderma)** is characterized by **excessive fibrosis and collagen deposition** in the skin and internal organs. The **CREST syndrome** is a limited form:
    a. **C**alcinosis
    b. **R**aynaud's phenomenon
    c. **E**sophageal dysmotility
    d. **S**clerodactyly
    e. **T**elangiectasias
24. **Diffuse Scleroderma** involves truncal skin thickening and has a higher risk of rapid progression to **Scleroderma Renal Crisis**, which presents with **malignant hypertension and acute kidney injury**. Treatment is with **ACE inhibitors**.
25. **Anti-Scl-70 (Topoisomerase I)** antibody is associated with **diffuse scleroderma** and increased risk of **pulmonary fibrosis**.
26. **Anti-Centromere** antibody is associated with the **limited (CREST)** form of scleroderma.
27. **Dermatomyositis** is characterized by **proximal muscle weakness** and a **heliotrope rash** (violaceous rash on eyelids) and **Gottron's papules** (scaly plaques over MCPs, PIPs, elbows, knees).
28. Dermatomyositis is strongly associated with an **increased risk of malignancy** (e.g., ovarian, lung, GI). Age-appropriate cancer screening is mandatory.
29. The most specific autoantibody for **Dermatomyositis** is **Anti-Mi-2**, but **Anti-Jo-1** (associated with the **anti-synthetase syndrome**, which includes interstitial lung disease, mechanics' hands, and non-erosive arthritis) is also common.
30. **Polymyositis** presents with **proximal muscle weakness without the classic skin findings** of dermatomyositis. It is less associated with malignancy.

Vasculitides

31. Vasculitides are classified by the size of the blood vessel involved.
32. **Large-Vessel Vasculitis:**

a. **Giant Cell (Temporal) Arteritis**: Affects patients **>50 years old**. Presents with **headache, jaw claudication, scalp tenderness, and visual disturbances (which is an emergency)**. **ESR and CRP are markedly elevated**. Diagnosis is by **temporal artery biopsy**. Treat immediately with **high-dose steroids** to prevent blindness.
b. **Takayasu's Arteritis**: "Pulseless disease." Affects **young women (<40)**. Involves the aortic arch and its branches, leading to diminished pulses and blood pressure discrepancies.

33. **Medium-Vessel Vasculitis:**
    a. **Polyarteritis Nodosa (PAN)**: Causes **focal, segmental necrosis of arteries**, leading to microaneurysms. Involves **kidneys (renovascular hypertension), skin, nerves (mononeuritis multiplex), and GI tract**. Strongly associated with **Hepatitis B**.
    b. **Kawasaki Disease**: A febrile illness of **childhood**. Diagnostic criteria include fever >5 days plus 4 of 5: **1. Bilateral non-purulent conjunctival injection, 2. Oral mucous membrane changes (strawberry tongue), 3. Polymorphous rash, 4. Cervical lymphadenopathy, 5. Changes in extremities (edema/erythema, later desquamation)**. Treat with **IVIG and Aspirin** to prevent **coronary artery aneurysms**.
34. **Small-Vessel Vasculitis (ANCA-Associated):**
    a. **Granulomatosis with Polyangiitis (GPA, formerly Wegener's)**: Triad of **upper/lower respiratory tract necrotizing granulomas** and **necrotizing glomerulonephritis**. **c-ANCA (PR3-ANCA)** is highly specific.
    b. **Microscopic Polyangiitis (MPA)**: Involves **necrotizing glomerulonephritis and pulmonary capillaritis** (diffuse alveolar hemorrhage). **p-ANCA (MPO-ANCA)** is common.
    c. **Eosinophilic Granulomatosis with Polyangiitis (EGPA, formerly Churg-Strauss)**: Triad of **asthma, eosinophilia, and vasculitis**. **p-ANCA (MPO-ANCA)** is positive in ~50% of cases.

Crystal-Induced Arthropathies

35. **Gout** is caused by the deposition of **monosodium urate** crystals in joints, due to **hyperuricemia**. It typically presents as an **acute, exquisitely painful monoarthritis**.
36. The **first MTP joint** is the most commonly affected site in gout (**podagra**). Tophi are chronic, subcutaneous deposits of urate crystals.

37. Diagnosis of gout is confirmed by **joint aspiration** showing **negatively birefringent, needle-shaped crystals** under polarized light.
38. Acute gout attacks are treated with **NSAIDs, Colchicine, or steroids**. **Allopurinol** or **Febuxostat** are urate-lowering therapies used for chronic management but are **contraindicated during an acute flare** as they can prolong the attack.
39. **Pseudogout** is caused by the deposition of **calcium pyrophosphate dihydrate (CPPD)** crystals. It also presents as an acute monoarthritis, commonly affecting the **knee**.
40. Diagnosis of pseudogout is confirmed by joint aspiration showing **weakly positively birefringent, rhomboid-shaped crystals**. X-ray may show **chondrocalcinosis** (calcification of articular cartilage).

Other Key Conditions & Facts

41. **Osteoarthritis (OA)** is a **non-inflammatory**, degenerative joint disease characterized by the breakdown of articular cartilage. It typically affects **DIPs (Heberden's nodes) and PIPs (Bouchard's nodes)**, hips, and knees. Pain is **worse with activity and better with rest**.
42. **Sjögren's Syndrome** is an autoimmune disorder characterized by **lymphocytic infiltration of exocrine glands**, leading to **dry eyes (keratoconjunctivitis sicca)** and **dry mouth (xerostomia)**. It is associated with **Anti-Ro (SS-A)** and **Anti-La (SS-B)** antibodies.
43. **Raynaud's Phenomenon** is vasospasm of digital arteries, causing color changes (white → blue → red). **Primary Raynaud's** is idiopathic and benign. **Secondary Raynaud's** is associated with autoimmune diseases like scleroderma, SLE, and RA.
44. **Antiphospholipid Syndrome (APS)** is characterized by **arterial/venous thrombosis and recurrent pregnancy losses** in the presence of **Lupus Anticoagulant, Anti-Cardiolipin, or Anti-β2-Glycoprotein I antibodies**. Treat with **lifelong anticoagulation**.
45. **Polymyalgia Rheumatica (PMR)** presents in patients **>50** with **pain and stiffness in the shoulder and hip girdles**. It is associated with a **markedly elevated ESR/CRP**. It is closely linked with **Giant Cell Arteritis**.
46. **Hypertrophic Osteoarthropathy** is characterized by **clubbing, periostitis of long bones, and arthritis**. It is commonly associated with **lung cancer** and other intrathoracic malignancies.
47. **Lyme Disease**, caused by *Borrelia burgdorferi*, can present in its late stage with a **migratory oligoarthritis**, often affecting the **knee**. Diagnosis is clinical and serological.

48. **Sarcoidosis** can cause an **acute arthritis** that is often associated with **erythema nodosum** and **bilateral hilar lymphadenopathy (Löfgren's Syndrome)**. This presentation has a good prognosis.
49. **Behçet's Disease** is a systemic vasculitis characterized by the triad of **oral aphthous ulcers, genital ulcers, and uveitis**. The **pathergy test** is a classic finding (skin hyperreactivity).
50. **Hemochromatosis** can cause a **degenerative arthropathy** that resembles osteoarthritis, often affecting the **2nd and 3rd MCP joints**. This is a classic clue.

Nephrology

Acid-Base Disorders

1. **Metabolic Acidosis:** Primary deficit of HCO_3^-; pH <7.35, HCO_3^- <22 mEq/L. The **Anion Gap (AG)** is crucial: AG = $[Na^+]$ - ($[Cl^-]$ + $[HCO_3^-]$). Normal AG is 10-12 mEq/L.
2. **Anion Gap Metabolic Acidosis (High AG):** Use the **MUDPILES** mnemonic: **M**ethanol, **U**remia, **D**KA, **P**araldehyde, **I**NH, **L**actic acidosis, **E**thylene glycol, **S**alicylates.
3. **Non-Anion Gap (Hyperchloremic) Metabolic Acidosis:** Causes include **diarrhea** (loss of HCO_3^-), **Renal Tubular Acidosis (RTA)**, and certain kidney diseases.
4. **Renal Tubular Acidosis (RTA):**
    a. **Type 1 (Distal RTA):** Defect in distal H^+ secretion. Urine pH **>5.5**, associated with **hypokalemia** and **nephrolithiasis**.
    b. **Type 2 (Proximal RTA):** Defect in proximal HCO_3^- reabsorption. Urine pH **<5.5** *after* HCO_3^- is depleted, associated with **hypokalemia** and **Fanconi syndrome**.
    c. **Type 4 (Hyperkalemic RTA):** Due to **aldosterone deficiency or resistance**. Urine pH **<5.5**, associated with **hyperkalemia**. Common in diabetes and with medications like ACEi, ARBs, spironolactone.
5. **Metabolic Alkalosis:** Primary excess of HCO_3^-; pH >7.45, HCO_3^- >26 mEq/L. Maintained by **chloride depletion** (e.g., vomiting, diuretics). It is **chloride-**

responsive if urine [Cl^-] <10 mEq/L (treat with saline) and **chloride-resistant** if urine [Cl^-] >20 mEq/L (e.g., hyperaldosteronism).

6. **Respiratory Acidosis:** Primary excess of CO_2; pH <7.35, $PaCO_2$ >45 mmHg. Causes include **hypoventilation** (e.g., COPD, opioid overdose).
7. **Respiratory Alkalosis:** Primary deficit of CO_2; pH >7.45, $PaCO_2$ <35 mmHg. Causes include **hyperventilation** (e.g., anxiety, pain, early asthma, salicylate toxicity).

Electrolytes & Fluid Balance

8. **SIADH (Syndrome of Inappropriate ADH):** Characterized by **euvolemic hyponatremia**, serum osmolality <275 mOsm/kg, **inappropriately concentrated urine** (Uosm >100), and **high urine sodium** (>40 mEq/L). First-line treatment is **fluid restriction**.
9. **Hypernatremia** is always due to a **water deficit**. It implies impaired access to water or a defect in thirst. The key lab is **urine osmolality**: high (>600) with extrarenal water loss, low (<300) with diabetes insipidus (DI).
10. **Diabetes Insipidus (DI):** Characterized by the production of large volumes of dilute urine.
    a. **Central DI:** Lack of ADH. Treat with **Desmopressin (DDAVP)**.
    b. **Nephrogenic DI:** Renal resistance to ADH. Causes include **lithium**, **hypercalcemia**, **hypokalemia**.
11. **Hyperkalemia ECG Changes (Mnemonic: "K-BIG"):** Peaked **T** waves → **P**R prolongation → Loss of **P** waves → Widened **QRS** → **S**ine wave → Asystole.
12. **Acute Hyperkalemia Management (C-BIG): C**alcium gluconate (stabilizes myocardium), **B**eta-agonists (albuterol), **I**nsulin (with glucose), and loop diuretics or **G**lucose-resins (Kayexalate) or dialysis.
13. **Hypokalemia ECG Changes: U** waves, flattened T waves, ST depression. Can cause **rhabdomyolysis**.
14. **Hypercalcemia:** The most common causes are **malignancy** (e.g., bone mets, PTHrP) and **primary hyperparathyroidism**. Symptoms: "Stones, Bones, Groans, and Psychiatric Overtones." Acute treatment includes **IV fluids** and **loop diuretics** (after rehydration).

Acute Kidney Injury (AKI)

15. **AKI** is defined by an abrupt (hours to days) decrease in kidney function. Staged by an increase in serum creatinine and/or a decrease in urine output.

16. **Prerenal Azotemia:** Due to reduced renal perfusion (e.g., dehydration, CHF, hemorrhage). **BUN/Cr ratio >20:1**, **FeNa <1%**, urine osmolality >500. It is reversible if the cause is corrected.
17. **Intrinsic Renal AKI:** Damage to the kidney itself. Divided by anatomy:
    a. **Vascular:** Renal artery stenosis, vasculitis, atheroemboli (after vascular procedure).
    b. **Glomerular:** Glomerulonephritis.
    c. **Tubular: Acute Tubular Necrosis (ATN)** is the **most common cause of hospital-acquired AKI**. Causes include ischemia (prolonged prerenal) and toxins (e.g., aminoglycosides, contrast dye, myoglobin). **FeNa >2%**, muddy brown granular casts on urinalysis.
    d. **Interstitial:** Acute Interstitial Nephritis (AIN). Often drug-induced (e.g., PPIs, NSAIDs, antibiotics). Triad of fever, rash, eosinophilia. WBC casts and eosinophiluria may be present.
18. **Postrenal AKI:** Due to obstruction of urine flow (e.g., BPH, stones, cervical cancer). Often presents with anuria or fluctuating urine output. First diagnostic step is a **renal/bladder ultrasound** to look for hydronephrosis.
19. **Hepatorenal Syndrome (HRS):** A type of prerenal AKI in patients with advanced cirrhosis. Diagnosis requires **absence of shock, no improvement with fluid challenge, and no proteinuria**. Urine sodium is **very low (<10 mEq/L)**.

Glomerular Disease

20. **Nephritic Syndrome:** Characterized by **hematuria (RBC casts), hypertension, mild-moderate proteinuria (<3.5 g/day), and azotemia**. Caused by inflammation within the glomerulus.
21. **Nephrotic Syndrome:** Characterized by **heavy proteinuria (>3.5 g/day), hypoalbuminemia (<3.0 g/dL), edema, and hyperlipidemia**. Caused by podocyte injury and loss of the glomerular charge barrier.
22. **Minimal Change Disease (MCD):** The **most common cause of nephrotic syndrome in children**. Often presents after an URI or immunization. No findings on light microscopy; **foot process effacement** on electron microscopy. **Highly responsive to steroids**.
23. **Focal Segmental Glomerulosclerosis (FSGS):** A common cause of nephrotic syndrome in **African American adults**. Can be idiopathic or secondary (HIV, obesity, sickle cell). Does not respond well to steroids. Electron microscopy shows foot process effacement.

24. **Membranous Nephropathy:** The **most common cause of primary nephrotic syndrome in Caucasian adults**. Associated with **anti-PLA2R antibodies**. Can be secondary to malignancies (e.g., lung, colon), infections (Hepatitis B), or SLE.
25. **Post-Streptococcal Glomerulonephritis (PSGN):** A classic nephritic syndrome that occurs **1-2 weeks** after a Group A Strep infection (pharyngitis or impetigo). Labs show **low C3**, elevated ASO titer. Treatment is supportive; prognosis in children is excellent.
26. **IgA Nephropathy (Berger's Disease):** The **most common primary glomerulonephritis worldwide**. Presents with **synchronous gross hematuria 1-2 days after an URI** ("sympharyngitic"). Diagnosis requires renal biopsy showing **mesangial IgA deposits**.
27. **Goodpasture's Syndrome:** Anti-GBM antibody disease causing **rapidly progressive glomerulonephritis (RPGN)** and **diffuse alveolar hemorrhage**. Biopsy shows **linear IgG deposition**. Treat with plasmapheresis and immunosuppression.
28. **Rapidly Progressive Glomerulonephritis (RPGN):** A medical emergency characterized by a rapid decline in renal function (50% decline in GFR in 3 months), often with crescent formation on biopsy ("crescentic GN").

Chronic Kidney Disease (CKD) & Tubular Disorders

29. **CKD** is defined as kidney damage or a GFR <60 mL/min/1.73 m^2 for ≥3 months. Staged from 1-5 based on GFR.
30. **Complications of CKD:**
    a. **Anemia:** Due to decreased **Erythropoietin** production. Treat with **erythropoiesis-stimulating agents (ESAs)**.
    b. **Renal Osteodystrophy:** Due to impaired Vitamin D activation and **secondary hyperparathyroidism**. Labs: **↓ Ca^{2+}, ↑ PO_4^{3-}, ↑ PTH**.
    c. **Metabolic Acidosis:** Due to impaired acid excretion.
31. **Indications for Dialysis (AEIOU): A**cidosis (refractory), **E**lectrolytes (refractory hyperkalemia), **I**ngestions (toxic alcohols), **O**verload (fluid), **U**remia (pericarditis, encephalopathy).
32. **Fanconi Syndrome:** A generalized defect of the **proximal convoluted tubule** leading to glycosuria (with normal blood glucose), aminoaciduria, phosphaturia, and bicarbonaturia (proximal RTA). Causes include cystinosis, multiple myeloma, and heavy metals.

Hypertension & Vascular Disorders

33. **Hypertensive Emergency:** Severe hypertension (>180/120) with evidence of **end-organ damage** (e.g., encephalopathy, retinal hemorrhages, pulmonary edema, AKI). Requires **IV antihypertensives** (e.g., nicardipine, labetalol) in a controlled setting.
34. **Renal Artery Stenosis:** Can be from **Atherosclerosis** (older men, ostial lesion) or **Fibromuscular Dysplasia** (young women, "string of beads" on angiography). Presents with refractory hypertension, AKI after starting an ACEi/ARB (in bilateral disease), and a **renal bruit**.
35. **Nephrolithiasis (Kidney Stones):** The most common type is **Calcium Oxalate**. **Struvite** stones ("staghorn calculi") are associated with **UTIs from urease-producing bacteria** (e.g., *Proteus, Klebsiella*).

Urinalysis & Diagnostic Findings

36. **Casts:** Formed in the renal tubules.
    a. **Hyaline Casts:** Benign; seen in dehydration.
    b. **Granular Casts:** Nonspecific; seen in ATN.
    c. **WBC Casts: Pyelonephritis** or **Interstitial Nephritis**.
    d. **RBC Casts: Pathognomonic for Glomerulonephritis**.
37. **Oval Fat Bodies/Maltese Crosses:** Lipid-laden tubular cells seen in **Nephrotic Syndrome**.
38. **Eosinophiluria:** Suggests **Acute Interstitial Nephritis (AIN)** or **atheroembolic disease**.

Pharmacology

39. **ACE Inhibitors & ARBs** are **renoprotective** in diabetic and proteinuric kidney disease. They can cause **hyperkalemia** and a **dry cough** (ACEi only). **Contraindicated in pregnancy** and bilateral renal artery stenosis.
40. **Spironolactone & Eplerenone:** Potassium-sparing diuretics that are **aldosterone antagonists**. Can cause **hyperkalemia**, especially when combined with ACEi/ARBs.
41. **Contrast-Induced Nephropathy:** Risk factors include pre-existing CKD, diabetes, dehydration. Prevention includes **IV hydration with isotonic saline** and using the **lowest possible dose** of **low-osmolar or iso-osmolar** contrast.

Inherited & Other Disorders

42. **Autosomal Dominant Polycystic Kidney Disease (ADPKD):** Caused by mutations in *PKD1* or *PKD2*. Presents in adulthood with bilateral kidney cysts, hypertension, and eventual ESRD. Associated with **hepatic cysts**, **berry aneurysms**, and mitral valve prolapse.
43. **Nephrogenic Systemic Fibrosis:** A fibrosing disorder of the skin and internal organs triggered by **gadolinium-based contrast agents** in patients with **advanced CKD (GFR <30)**.
44. **Wilms' Tumor (Nephroblastoma):** The most common primary renal tumor of childhood. Associated with **WAGR syndrome** (Wilms', Aniridia, Genitourinary malformations, Retardation) and **Beckwith-Wiedemann syndrome**.
45. **Renal Cell Carcinoma (RCC):** The most common primary renal tumor in adults. Classic triad: **hematuria, flank pain, abdominal mass** (rarely all present). Associated with **Von Hippel-Lindau disease** (clear cell RCC). A classic paraneoplastic syndrome is **polycythemia** due to EPO production.
46. **Uric Acid Stones:** Radiolucent stones. Form in **acidic urine**. Associated with **gout** and **tumor lysis syndrome**.
47. **Cystinuria:** An inherited defect in the reabsorption of **cystine, ornithine, lysine, arginine (COLA)**. Leads to recurrent **cystine stones**, which are radiopaque.
48. **Nephron Physiology (Mnemonic):** "A **H**en **L**ays **E**ggs **D**aily" for solute reabsorption sites: **A**lpha-intercalated cell (H^+), **H**enle's loop (Na^+, K^+, Cl^-), **L**ate DCT/Collecting Duct (Na^+, K^+), **E**arly DCT (Na^+, Cl^-), **D**istal Convoluted Tubule (Ca^{2+}).
49. **Bartter Syndrome:** Defect in the **Na^+-K^+-$2Cl^-$ cotransporter (NKCC2)** in the thick ascending limb. Presents like a patient on **loop diuretics**: hypokalemia, metabolic alkalosis, hypercalciuria.
50. **Gitelman Syndrome:** Defect in the **Na^+-Cl^- cotransporter (NCC)** in the distal convoluted tubule. Presents like a patient on **thiazide diuretics**: hypokalemia, metabolic alkalosis, **hypocalciuria**.

Neurology

Stroke & Neuroanatomy

1. **Middle Cerebral Artery (MCA) Stroke:** The **most common** ischemic stroke. Contralateral **face and arm weakness/sensory loss** > leg. If dominant hemisphere: **aphasia**. If non-dominant: **neglect**.

2. **Anterior Cerebral Artery (ACA) Stroke:** Affects **leg** > arm. Contralateral leg weakness/sensory loss, executive dysfunction, and urinary incontinence.
3. **Posterior Cerebral Artery (PCA) Stroke:** Causes **contralateral homonymous hemianopia** (often with macular sparing). Can also cause memory impairment if temporal lobe is affected.
4. **Lacunar Strokes:** Small, deep infarcts from occlusion of small penetrating arteries (e.g., lenticulostriate arteries). Common types: **Pure motor stroke** (internal capsule), **pure sensory stroke** (thalamus), ataxic hemiparesis.
5. **Weber Syndrome:** Midbrain stroke. **Ipsilateral CN III palsy** (eye down and out) with **contralateral hemiparesis**.
6. **Wallenberg Syndrome (Lateral Medullary Syndrome):** PICA stroke. **Ipsilateral:** Horner's, facial pain/temp loss, ataxia, dysphagia/dysarthria. **Contralateral:** body pain/temp loss.
7. **tPA for Ischemic Stroke:** Must be given **within 4.5 hours** of symptom onset. Major contraindications: **intracranial hemorrhage**, recent major surgery, BP >185/110.
8. **Hemorrhagic Stroke (ICH):** Common causes are **hypertension** (putamen, thalamus, pons, cerebellum) and **cerebral amyloid angiopathy** (lobar hemorrhages in elderly).
9. **Berry Aneurysm Rupture:** Presents as **"thunderclap" headache** (worst headache of life). Most common location is the **Anterior Communicating Artery (ACom)**. Associated with **ADPKD** and **Ehlers-Danlos**.

Seizures & Epilepsy

10. **Focal (Partial) Seizures:**
    a. **Without impaired awareness:** Formerly "simple partial." Patient remains aware.
    b. **With impaired awareness:** Formerly "complex partial." Impaired consciousness, often from **temporal lobe** (aura, automatisms).
11. **Generalized Seizures:**
    a. **Tonic-Clonic:** Loss of consciousness, tonic then clonic movements.
    b. **Absence:** Brief (10s) lapses of consciousness with staring, no post-ictal period. **EEG: 3 Hz spike-and-wave**. Common in children.
    c. **Myoclonic:** Sudden, brief muscle jerks.
12. **Status Epilepticus:** Continuous seizure >5 mins or recurrent seizures without regaining consciousness. First-line treatment: **Benzodiazepines** (Lorazepam IV).
13. **First-Line Antiepileptics:**
    a. **Focal seizures: Levetiracetam**, Carbamazepine, Lamotrigine.

   b. **Generalized Tonic-Clonic: Levetiracetam**, Valproate.
   c. **Absence: Ethosuximide** (first-line), Valproate.
14. **Carbamazepine** can cause **SIADH** (hyponatremia) and is a strong **CYP450 inducer**. **Valproate** can cause **hepatotoxicity**, **neural tube defects**, and **hyperammonemia**.

Headache

15. **Migraine:** Often unilateral, pulsating, with **nausea/vomiting, photophobia, phonophobia**. Can have **aura** (e.g., scintillating scotoma) before headache.
16. **Cluster Headache:** Severe, unilateral, periorbital/temporal pain lasting 15-180 mins. Associated with **ipsilateral lacrimation, rhinorrhea, ptosis, miosis**. More common in **young men**. Abortive therapy: **High-flow oxygen**.
17. **Trigeminal Neuralgia:** Brief, severe, stabbing, unilateral facial pain in V2/V3 distribution. Triggered by light touch. First-line treatment: **Carbamazepine**.
18. **Temporal (Giant Cell) Arteritis:** Unilateral headache in patient **>50**, with **jaw claudication**, scalp tenderness. **ESR/CRP elevated**. Risk of **permanent vision loss**. Treat with **high-dose steroids immediately**.

Dementia & Neurodegenerative

19. **Alzheimer's Disease:** Most common dementia. **Memory impairment** (especially episodic) is early. Pathology: **Amyloid plaques** (Aβ42) & **Neurofibrillary tangles** (hyperphosphorylated tau). **ApoE4** is a major risk factor.
20. **Lewy Body Dementia:** Triad: **Fluctuating cognition**, **visual hallucinations**, **parkinsonism**. Pathology: **Lewy bodies** (alpha-synuclein). **Antipsychotics are contraindicated** (can cause severe rigidity).
21. **Frontotemporal Dementia (FTD):** Presents with **personality/behavior changes** (disinhibition) or **progressive aphasia**. Pathology: tau or TDP-43 inclusions. **Memory is relatively spared early on**.
22. **Parkinson's Disease: TRAP: T**remor (pill-rolling, resting), **R**igidity (cogwheel), **A**kinesia/Bradykinesia, **P**ostural instability. Pathology: loss of dopaminergic neurons in **substantia nigra**; Lewy bodies.
23. **Parkinson's Treatment: Levodopa/Carbidopa** is most effective. **Dopamine agonists** (e.g., pramipexole) can cause impulse control disorders.
24. **Multiple Sclerosis (MS):** Autoimmune demyelination of CNS. Presents with **relapsing, remitting neurological deficits** separated in time and space (e.g., optic

neuritis, internuclear ophthalmoplegia). **MRI** shows periventricular white matter lesions. CSF shows **oligoclonal bands**.

25. **Amyotrophic Lateral Sclerosis (ALS):** Affects both **upper motor neurons** (spasticity, hyperreflexia) and **lower motor neurons** (fasciculations, muscle atrophy). **Cognition and sensation are spared**.

Neuromuscular Junction & Muscle

26. **Myasthenia Gravis (MG):** Autoantibodies against **ACh receptors** at the NMJ. Presents with **fatigable weakness** (ptosis, diplopia, dysphagia). **Edrophonium (Tensilon) test** is positive. Treat with **acetylcholinesterase inhibitors** (pyridostigmine), steroids, thymectomy.
27. **Lambert-Eaton Myasthenic Syndrome (LEMS):** Autoantibodies against **presynaptic voltage-gated calcium channels**. Presents with **proximal muscle weakness that *improves* with repeated use**. Strongly associated with **Small Cell Lung Cancer**. **Absent reflexes** that reappear after exercise.
28. **Guillain-Barré Syndrome (GBS):** Acute inflammatory demyelinating polyneuropathy. **Ascending symmetric weakness** and areflexia, often following a GI or respiratory infection (e.g., *C. jejuni*). **CSF: Albuminocytologic dissociation** (high protein, normal WBC). Treat with **IVIG** or plasmapheresis.

Spinal Cord & Peripheral Nerve

29. **Brown-Séquard Syndrome:** Hemi-section of the spinal cord. **Ipsilateral:** loss of fine touch/vibration (dorsal columns) and **UMN weakness** (corticospinal tract). **Contralateral:** loss of pain/temp (spinothalamic tract).
30. **Anterior Spinal Artery Syndrome:** Bilateral loss of **pain/temp** and **motor** function below the lesion. **Proprioception and vibration are spared** (dorsal columns preserved).
31. **Vitamin B12 Deficiency:** Causes **subacute combined degeneration**. Affects **dorsal columns** (loss of vibration/proprioception) and **corticospinal tracts** (UMN signs). **Megaloblastic anemia** is often present.
32. **Carpal Tunnel Syndrome:** Compression of **median nerve** at wrist. Presents with pain/numbness in **thumb, index, middle, and radial half of ring finger**. **Thenar atrophy** in severe cases. **Tinel's sign** and **Phalen's maneuver** are provocative tests.

Infections & Neuro-ophthalmology

33. **Meningitis:**
    a. **Bacterial:** High WBC, low glucose, high protein. Common pathogens: *S. pneumoniae* (adults), *N. meningitidis* (young adults), *L. monocytogenes* (neonates, elderly, immunocompromised).
    b. **Viral:** Lymphocytic WBC, normal glucose, mildly elevated protein.
34. **Bell's Palsy:** Idiopathic, acute, unilateral **facial nerve (CN VII) palsy**. Patient cannot close eye, forehead is affected (differentiates from central stroke). Treat with **corticosteroids** +/- antivirals.
35. **Internuclear Ophthalmoplegia (INO):** Lesion in the **MLF**. On lateral gaze, the **adducting eye** (ipsilateral to lesion) is impaired, but the **abducting eye** has nystagmus. Classic for **MS**.
36. **Horner's Syndrome: Ptosis, Miosis, Anhidrosis**. Due to interruption of the sympathetic chain. Can be caused by Pancoast tumor, carotid dissection, or lateral medullary stroke.

Pediatric Neurology

37. **Cerebral Palsy (CP):** Non-progressive motor disorder due to injury to the developing brain. **Spastic diplegia** is the most common type, often associated with **prematurity** and periventricular leukomalacia.
38. **Febrile Seizures:** Brief, generalized seizures in children 6 months - 5 years with a fever. **Simple** (<15 mins, single in 24h) has an excellent prognosis. **Complex** features warrant further workup.
39. **Duchenne Muscular Dystrophy:** X-linked recessive, mutation in **dystrophin** gene. Presents in boys with **proximal muscle weakness**, **Gowers' maneuver**, **pseudohypertrophy of calves**. **Elevated Creatine Kinase (CK)**.

Pharmacology & Misc.

40. **Neuroleptic Malignant Syndrome (NMS):** Caused by **dopamine blockade** (e.g., antipsychotics). Triad: **Fever, rigidity, altered mental status**. Labs: **very high CK**. Treat with **dantrolene** and **bromocriptine**.
41. **Serotonin Syndrome:** Caused by **serotonergic excess** (e.g., SSRI + MAOI). Triad: **Fever, agitation/delirium, hyperreflexia/clonus**. Differentiated from NMS by **hyperreflexia** and **clonus** (vs. rigidity). Treat with **cyproheptadine**.

42. **Wernicke-Korsakoff Syndrome:** Due to **Thiamine (B1) deficiency** (often in alcoholism). **Wernicke's:** acute confusion, ataxia, ophthalmoplegia. **Korsakoff's:** chronic confabulation, anterograde/retrograde amnesia. Treat with **IV thiamine**.
43. **Normal Pressure Hydrocephalus (NPH):** Triad: **"Wacky, Wobbly, Wet"** (Dementia, Ataxia, Urinary incontinence). Treat with **ventriculoperitoneal (VP) shunt**.
44. **Pseudotumor Cerebri (Idiopathic Intracranial Hypertension):** Obese women of childbearing age. Headache, papilledema, vision loss. **LP shows high opening pressure, but normal CSF composition**. Treat with **Acetazolamide**; weight loss.
45. **Spinal Cord Compression (Oncologic Emergency):** Presents with back pain, weakness, sensory level, bowel/bladder dysfunction. **MRI spine** is diagnostic. Treat with **high-dose steroids** and emergent radiation/surgery.
46. **CNS Tumors:**
    a. **Adults: Metastases** > Glioblastoma (high-grade glioma in cerebral hemispheres) > Meningioma (benign, attached to dura).
    b. **Children: Posterior Fossa** tumors (e.g., Medulloblastoma, Pilocytic Astrocytoma, Ependymoma).
47. **Neurofibromatosis Type 1 (NF1): Café-au-lait spots**, neurofibromas, Lisch nodules, optic pathway gliomas. "Von Recklinghausen's disease."
48. **Neurofibromatosis Type 2 (NF2):** Bilateral **vestibular schwannomas** (CN VIII). Presents with hearing loss, tinnitus.
49. **Tuberous Sclerosis:** Triad: **Sebaceous adenomas**, seizures, intellectual disability. Associated with cardiac rhabdomyomas and renal angiomyolipomas.
50. **Huntington's Disease:** Autosomal dominant, **CAG repeat** expansion on chromosome 4. Presents in middle age with **chorea**, **psychiatric symptoms**, and **dementia**. **Atrophy of the caudate nucleus** on imaging.

Hematology

Anemias

1. **Microcytic Anemias (Low MCV):** Use the **TAILS** mnemonic: **T**halassemia, **A**nemia of Chronic Disease, **I**ron deficiency, **L**ead poisoning, **S**ideroblastic anemia.
2. **Iron Deficiency Anemia:** Most common anemia worldwide. Labs: **↓ MCV, ↓ serum iron, ↑ TIBC, ↓ ferritin**. Causes: chronic blood loss (e.g., GI, menorrhagia), increased demands (pregnancy), malabsorption.

3. **Anemia of Chronic Disease (ACD):** Labs: **↓ serum iron, ↓ TIBC, normal/high ferritin**. Due to **hepcidin-mediated iron sequestration**.
4. **Sideroblastic Anemia:** Defect in heme synthesis. Ringed sideroblasts on bone marrow biopsy. Can be hereditary (ALAS2 mutation) or acquired (alcohol, lead, vitamin B6 deficiency, MDS).
5. **Megaloblastic Anemias (High MCV):** Due to impaired DNA synthesis. Causes: **B12 deficiency** or **Folate deficiency**. Labs show **hypersegmented neutrophils (≥5 lobes)**.
6. **B12 (Cobalamin) Deficiency:** Causes: **Pernicious anemia** (anti-intrinsic factor/anti-parietal cell antibodies), malabsorption (Crohn's, post-gastrectomy). Neurologic symptoms: **subacute combined degeneration** (dorsal columns & corticospinal tracts).
7. **Folate Deficiency:** Causes: poor diet (lack of green veggies), increased demand (pregnancy), drugs (methotrexate, trimethoprim). **No neurologic symptoms**.
8. **Hemolytic Anemias - Intrinsic (Intracorpuscular) Defects:**
    a. **HS:** Spherocytes, **↓ MCHC**, defect in **spectrin/ankyrin**. Splenectomy is curative.
    b. **G6PD Deficiency:** X-linked. **Heinz bodies** and **bite cells**. Oxidant stress triggers (sulfa drugs, fava beans, antimalarials).
    c. **Sickle Cell Disease:** HbS point mutation (Glu→Val). **Target cells**, vaso-occlusive crises, autosplenectomy. Protect from hypoxia.
9. **Hemolytic Anemias - Extrinsic (Extracorpuscular) Defects:**
    a. **Autoimmune Hemolytic Anemia (AIHA): Warm** (IgG, spherocytes, treat with steroids) vs. **Cold** (IgM, agglutination, associated with *Mycoplasma*, CLL).
    b. **Microangiopathic Hemolytic Anemia (MAHA):** Schistocytes on smear. Causes: **TTP**, **HUS**, DIC, malignant hypertension.

Coagulation & Bleeding Disorders

10. **Coagulation Cascade:**
    a. **Intrinsic Pathway:** PTT. Factors XII, XI, IX, VIII.
    b. **Extrinsic Pathway:** PT/INR. Factor VII.
    c. **Common Pathway:** PT/PTT. Factors X, V, II (prothrombin), I (fibrinogen).
11. **Hemophilia A:** X-linked recessive. **Factor VIII deficiency**. Presents with **hematrhroses**, deep muscle bleeding. **Prolonged PTT**.
12. **Hemophilia B (Christmas Disease):** X-linked recessive. **Factor IX deficiency**. Also presents with prolonged PTT.

13. **von Willebrand Disease (vWD):** Most common inherited bleeding disorder. Defect in **vWF** → impaired platelet adhesion and **Factor VIII stabilization**. Presents with mucocutaneous bleeding. **Prolonged PTT & Bleeding Time**.
14. **Vitamin K Deficiency:** Fat-soluble vitamin required for **gamma-carboxylation** of Factors II, VII, IX, X, and Proteins C & S. Deficiency causes **↑ PT/INR & PTT**. Seen in newborns (no gut flora), malabsorption, warfarin use.
15. **Disseminated Intravascular Coagulation (DIC):** Widespread thrombosis and consumption of clotting factors/platelets → bleeding. Labs: **↑ PT/PTT, ↑ D-dimer, ↓ fibrinogen, ↓ platelets, schistocytes**. Treat underlying cause.
16. **Immune Thrombocytopenic Purpura (ITP):** Autoantibodies against **GpIIb/IIIa**. Isolated **↓ platelets**, normal other counts. **Megakaryocytes** are increased on bone marrow. First-line treatment: **steroids**, IVIG for acute crisis.
17. **Thrombotic Thrombocytopenic Purpura (TTP):** Pentad: Fever, **Thrombocytopenia**, **MAHA** (schistocytes), Renal dysfunction, Neurologic symptoms. Due to **ADAMTS13 deficiency** → uncleaved large vWF multimers → platelet microthrombi. Treat with **plasmapheresis**.

White Blood Cell Disorders

18. **Leukemoid Reaction: Benign**, extreme leukocytosis (>50,000) with a **left shift** (immature forms). High **Leukocyte Alkaline Phosphatase (LAP) score**.
19. **Chronic Myelogenous Leukemia (CML): Philadelphia chromosome t(9;22)** → **BCR-ABL** fusion protein (a tyrosine kinase). Presents with high WBC, splenomegaly. Treat with **tyrosine kinase inhibitors (Imatinib)**.
20. **Acute Leukemias:**
    a. **AML: Auer rods**, **MPO positive**. Associated with pre-existing MDS, chemotherapy (alkylating agents), Down syndrome.
    b. **ALL:** More common in **children**. **PAS positive**, **TdT positive**. Associated with Down syndrome.

Lymphoma & Plasma Cell Dyscrasias

21. **Hodgkin Lymphoma: Reed-Sternberg cells** (CD15+, CD30+). Presents with **painless lymphadenopathy**, **B symptoms** (fever, night sweats, weight loss). Staged I-IV. Often contiguous spread.
22. **Non-Hodgkin Lymphoma (NHL):** More common than HL. **Diffuse Large B-cell Lymphoma** is the most common type. **Burkitt Lymphoma** is associated with **t(8;14)** (c-myc) and **EBV**.

23. **Multiple Myeloma:** Malignant proliferation of **plasma cells**. CRAB: **C**alcium (elevated), **R**enal failure, **A**nemia, **B**one lesions (lytic, "punched-out"). **M-protein spike** on SPEP, **Bence Jones proteinuria** (light chains in urine). **Rouleaux formation** on peripheral smear.
24. **Monoclonal Gammopathy of Undetermined Significance (MGUS):** Asymptomatic M-spike <3 g/dL, <10% plasma cells in bone marrow. Risk of progression to myeloma.

Transfusion Medicine

25. **ABO Blood Groups:**
    a. Type A: A antigen, Anti-B antibody.
    b. Type B: B antigen, Anti-A antibody.
    c. Type AB: A & B antigens, **No antibodies (Universal Recipient)**.
    d. Type O: No A/B antigens, Anti-A & Anti-B antibodies (**Universal Donor**).
26. **Rh Factor:** Anti-Rh (Anti-D) antibodies only develop after exposure (e.g., pregnancy, transfusion). **Rh-negative mother** with Rh-positive fetus risks **Hemolytic Disease of the Newborn**.
27. **Transfusion Reactions:**
    a. **Acute Hemolytic:** ABO incompatibility. Fever, pain, hypotension, DIC. **Treat immediately!**
    b. **Febrile Non-Hemolytic:** Anti-leukocyte antibodies.
    c. **TRALI (Transfusion-Related Acute Lung Injury):** Non-cardiogenic pulmonary edema. Donor antibodies activate recipient neutrophils in lungs.
28. **Warfarin Reversal: Vitamin K** (slow), **Fresh Frozen Plasma (FFP)** or **PCC (Prothrombin Complex Concentrate)** for urgent reversal.

Physiology & Misc.

29. **Oxygen-Hemoglobin Dissociation Curve:**
    a. **Right Shift** (↓ affinity, ↑ O2 delivery): **Acidosis, ↑ CO2, ↑ Temp, ↑ 2,3-BPG**.
    b. **Left Shift** (↑ affinity, ↓ O2 delivery): **Alkalosis, ↓ CO2, ↓ Temp, ↓ 2,3-BPG, CO poisoning, Methemoglobinemia**.
30. **Methemoglobinemia:** Iron in **Fe^{3+}** state, cannot carry O2. Causes cyanosis, **chocolate-brown blood**. Causes: nitrates, dapsone, benzocaine. Treat with **Methylene blue**.
31. **Hereditary Spherocytosis:** Most common inherited membrane defect. **Spherocytes** on smear, ↑ MCHC, ↑ reticulocytes.

32. **Aplastic Anemia:** Pancytopenia with a **hypocellular bone marrow**. Causes: drugs (chloramphenicol), chemicals (benzene), viruses (Parvovirus B19, HCV), Fanconi anemia.
33. **Myelodysplastic Syndrome (MDS):** Clonal stem cell disorder → ineffective hematopoiesis → cytopenias with a **hypercellular bone marrow**. Can progress to AML.
34. **Myeloproliferative Neoplasms (MPNs):** Overproduction of mature blood cells.
    a. **Polycythemia Vera (PV):** ↑ RBCs, also ↑ WBC/Plt. **JAK2 mutation**. Pruritus after hot shower, thrombosis. Treat with phlebotomy.
    b. **Essential Thrombocythemia (ET):** ↑ Platelets. Risk of thrombosis/bleeding. **JAK2 or CALR mutation**.
35. **Heparin-Induced Thrombocytopenia (HIT):** Type II is immune-mediated. **↓ Platelets 5-10 days after starting heparin**, paradoxically **increases risk of thrombosis**. Diagnose with **anti-PF4 antibodies**. **Stop all heparin** and start a non-heparin anticoagulant (e.g., argatroban, fondaparinux).
36. **Hemochromatosis:** Usually **HFE gene mutation** (C282Y). ↑ Fe absorption → iron overload in liver (cirrhosis), pancreas (diabetes), heart (cardiomyopathy), skin (hyperpigmentation). Labs: ↑ Ferritin, ↑ Transferrin saturation.
37. **Haptoglobin:** Binds free hemoglobin. **Low in intravascular hemolysis**.
38. **Direct vs. Indirect Coombs Test:**
    a. **Direct:** Detects antibodies *on* RBC surface. Used in **Autoimmune Hemolytic Anemia, HDN**.
    b. **Indirect:** Detects antibodies *in* patient serum. Used in **blood crossmatching**.
39. **Döhle Bodies:** Blue cytoplasmic inclusions in neutrophils. Seen in **infections, burns, pregnancy**.
40. **Howell-Jolly Bodies:** Nuclear remnants in RBCs. Seen in **post-splenectomy, megaloblastic anemia**.
41. **Heinz Bodies:** Denatured hemoglobin. Seen in **G6PD deficiency**. Visible with **supravital stain**.
42. **Basophilic Stippling:** Aggregated ribosomes in RBCs. Seen in **lead poisoning, thalassemia**.
43. **Paroxysmal Nocturnal Hemoglobinuria (PNH):** Acquired mutation in **PIG-A** gene → deficiency of **CD55 & CD59** (complement inhibitors) → **intravascular hemolysis**. Presents with hemoglobinuria, thrombosis (especially hepatic veins - Budd-Chiari), pancytopenia. Diagnose with **flow cytometry** for CD55/CD59. Treat with **Eculizumab**.

44. **Lead Poisoning: Basophilic stippling**, **microcytic anemia**, encephalopathy, abdominal colic, **wrist/foot drop**. ↑ Free erythrocyte protoporphyrin (FEP).
45. **Beta-Thalassemia Major:** Deficient β-globin chains. Presents in infancy with severe anemia, hepatosplenomegaly, **chipmunk facies**, **hair-on-end skull** on X-ray.
46. **Alpha-Thalassemia:** Deletion of α-globin genes. Severity depends on number of deletions. **Hb Bart's** (4 gene deletion) causes hydrops fetalis.
47. **Glanzmann Thrombasthenia:** Deficiency of **GpIIb/IIIa**. Presents with mucocutaneous bleeding. **Prolonged bleeding time**, normal platelet count, abnormal platelet aggregation.
48. **Bernard-Soulier Syndrome:** Deficiency of **GpIb-IX**. Giant platelets, thrombocytopenia, abnormal ristocetin test.
49. **Protein C & S Deficiency:** Natural anticoagulants. Deficiency → **increased risk of thrombosis**. **Warfarin-induced skin necrosis** can occur when starting warfarin in Protein C deficient patients.
50. **Antithrombin III Deficiency:** ATIII inhibits thrombin and Factor Xa. Deficiency → **increased thrombosis**. **Heparin resistance** can be seen.

Gastroenterology

Esophagus

1. **Achalasia:** Failure of **lower esophageal sphincter (LES) relaxation** and loss of esophageal peristalsis due to loss of **myenteric (Auerbach's) plexus** neurons. Presents with **dysphagia to both solids and liquids** and regurgitation of undigested food. **"Bird's beak"** appearance on barium swallow. Manometry is gold standard. Treat with pneumatic dilation or Heller myotomy.
2. **GERD:** Due to transient LES relaxation. Can lead to **Barrett's esophagus** (columnar metaplasia), a pre-malignant condition for **adenocarcinoma**.
3. **Boerhaave's Syndrome:** Full-thickness **transmural esophageal rupture** due to violent vomiting. Presents with **Mackler's triad**: vomiting, chest pain, subcutaneous emphysema. A surgical emergency.
4. **Mallory-Weiss Syndrome: Mucosal tears** at the gastroesophageal junction from vomiting/retching. Presents with **hematemesis**.
5. **Plummer-Vinson Syndrome:** Triad of **Dysphagia** (due to esophageal web), **Iron-deficiency anemia**, and **glossitis**. Associated with increased risk of **squamous cell carcinoma** of the esophagus.

Stomach

6. **Peptic Ulcer Disease (PUD):**
    a. **Duodenal Ulcers:** Associated with **H. pylori**, **NSAIDs**. Pain **improves with food**.
    b. **Gastric Ulcers:** Associated with **H. pylori**, **NSAIDs**. Pain **worsens with food**. Must rule out malignancy via biopsy.
7. ***Helicobacter pylori***: Gram-negative rod. Diagnose with **urea breath test**, stool antigen, or biopsy. Treat with **triple therapy** (PPI + Clarithromycin + Amoxicillin/Metronidazole).
8. **Zollinger-Ellison Syndrome:** Due to **gastrin-secreting tumor (gastrinoma)**, often in the **"Passage" (Pancreas, Duodenum)**. Causes refractory, multiple PUDs and **diarrhea**. Part of **MEN 1**.
9. **Gastric Cancer: Intestinal type** is associated with *H. pylori* and environmental factors. **Diffuse type** (Signet ring cells) is associated with **hereditary diffuse gastric cancer syndrome (CDH1 mutation)** and has a "linitis plastica" appearance.

Liver & Biliary

10. **Viral Hepatitis Serology:**
    a. **Hep B: HBsAg+ = infection. Anti-HBs+ = immunity. Anti-HBc IgM = acute infection. HBeAg = high infectivity.**
    b. **Hep C:** Diagnose with **HCV antibody**, confirm with **HCV RNA PCR**. Major cause of chronic hepatitis, cirrhosis, HCC. **No vaccine**.
11. **Alcoholic Liver Disease Spectrum: Fatty liver → Alcoholic Hepatitis (AST:ALT >2:1) → Cirrhosis**.
12. **Nonalcoholic Fatty Liver Disease (NAFLD):** Spectrum from steatosis to **NASH** (steatohepatitis) to cirrhosis. Strongly associated with **Metabolic Syndrome**.
13. **Autoimmune Hepatitis:** More common in women. **Elevated IgG**, positive **ANA** and/or **Anti-smooth muscle antibody (ASMA)**. Treat with **corticosteroids**.
14. **Primary Biliary Cholangitis (PBC):** Autoimmune destruction of **small intrahepatic bile ducts**. Middle-aged women. **Anti-Mitochondrial Antibody (AMA) positive**. **Elevated Alkaline Phosphatase & Cholesterol**. Pruritus.
15. **Primary Sclerosing Cholangitis (PSC):** Inflammation and fibrosis of **intra- and extra-hepatic bile ducts**. "Beaded" appearance on ERCP/MRCP. Strongly associated with **Inflammatory Bowel Disease (IBD)**, especially **Ulcerative Colitis**. Increased risk of **cholangiocarcinoma**.

16. **Wilson's Disease:** Autosomal recessive defect in copper excretion (**ATP7B gene**). Presents with **hepatic** (cirrhosis, hepatitis), **neurologic** (movement disorders), and **psychiatric** symptoms. **Kayser-Fleischer rings**, low **ceruloplasmin**, high urinary copper.
17. **Hemochromatosis:** Autosomal recessive (**HFE gene - C282Y**). Iron overload → **cirrhosis, "bronze" diabetes, cardiomyopathy, arthropathy**. Labs: **↑ Ferritin, ↑ Transferrin saturation**.
18. **Alpha-1 Antitrypsin Deficiency: PiZZ** genotype. Causes **panacinar emphysema** and **hepatitis/cirrhosis** due to accumulation of misfolded protein in hepatocytes. PAS-positive, diastase-resistant globules on liver biopsy.
19. **Hepatorenal Syndrome (HRS):** Functional renal failure in advanced cirrhosis. Diagnosis requires **no improvement with fluid challenge and low urine sodium (<10 mEq/L)**.
20. **Spontaneous Bacterial Peritonitis (SBP):** Infection of ascitic fluid in cirrhotic patients. Most common organism is **E. coli**. Diagnose with **paracentesis** (>250 PMNs). Treat with **3rd gen cephalosporin (e.g., Ceftriaxone)**.
21. **Acute Pancreatitis:** Most common causes are **Gallstones (GET SMASHED)** and **Ethanol**. Diagnose with **↑ Lipase** (more specific than amylase). **Ranson's Criteria** and **CTSI** used for prognosis.
22. **Chronic Pancreatitis: Calcifications** on imaging, steatorrhea, malabsorption. **Pancreatic insufficiency** leads to deficiency of **fat-soluble vitamins (A, D, E, K)**.

Small Intestine & Malabsorption

23. **Celiac Disease:** Immune-mediated reaction to **gliadin (gluten)**. Presents with diarrhea, weight loss, bloating. Associated with **Dermatitis Herpetiformis**. Labs: **Anti-tTG IgA**. Biopsy shows **villous atrophy, intraepithelial lymphocytes**. Treat with **gluten-free diet**.
24. **Lactose Intolerance:** Due to **lactase deficiency**. Presents with bloating, diarrhea, flatulence after dairy ingestion. Diagnose with **hydrogen breath test**.
25. **Inflammatory Bowel Disease (IBD):**
    a. **Crohn's Disease:** Can affect **any part of GI tract** (mouth to anus), **skip lesions**, **transmural** inflammation. Complications: fistulas, strictures, **creeping fat**. Non-caseating **granulomas**.
    b. **Ulcerative Colitis: Continuous** inflammation starting at the **rectum**, limited to the **mucosa/submucosa**. Presents with **bloody diarrhea**, tenesmus. **Toxic megacolon** is a feared complication. Increased risk of **colorectal cancer**.

26. **Irritable Bowel Syndrome (IBS):** Functional disorder. **Rome IV Criteria**: recurrent abdominal pain associated with defecation or a change in bowel habits. No structural pathology. **IBS-D** (diarrhea), **IBS-C** (constipation).
27. **Diverticular Disease:**
    a. **Diverticulosis:** Outpouchings (false diverticula) due to high intraluminal pressure. Most common in **sigmoid colon**. Can cause **painless lower GI bleeding**.
    b. **Diverticulitis:** Inflammation/infection of diverticula. Presents with **LLQ pain, fever, leukocytosis**. Treat with antibiotics.

Colon & Appendix

28. **Colorectal Cancer (CRC):** Most are **adenocarcinomas**. Screening starts at age 45. **APC gene** mutation is key in **Familial Adenomatous Polyposis (FAP)**. **Lynch Syndrome (HNPCC)** is associated with MSI-H tumors.
29. **Appendicitis:** Presents with **periumbilical pain migrating to RLQ**, anorexia, fever. **McBurney's point** tenderness. **Rovsing's sign** (pain in RLQ upon palpation of LLQ).
30. **Clostridium difficile Infection:** Causes antibiotic-associated colitis. Toxins A (enterotoxin) and B (cytotoxin). Diagnose with **PCR for toxin genes** or EIA for toxins. Treat with **oral Vancomycin** or **Fidaxomicin** for initial episode.

Vascular & Miscellaneous

31. **Ischemic Colitis:** Typically affects **watershed areas** (splenic flexure, rectosigmoid junction). Presents with sudden-onset abdominal pain and bloody diarrhea in an elderly patient with vascular disease.
32. **Angiodysplasia:** Vascular malformation, usually in **right colon**. Common cause of **lower GI bleeding in the elderly**.
33. **Acute Mesenteric Ischemia:** "Pain out of proportion to exam." Often due to **superior mesenteric artery (SMA) embolism** (e.g., in AFib). High mortality.
34. **Carcinoid Syndrome:** Occurs with **liver metastases** from carcinoid tumors (often ileal). Presents with **flushing, diarrhea, wheezing, right-sided valvular heart disease**. Due to secretion of **serotonin (5-HT)**.
35. **Short Bowel Syndrome:** Malabsorption after massive small bowel resection. Leads to **fat-soluble vitamin deficiencies, oxalate kidney stones**.

Physiology & Pharmacology

36. **GI Hormones:**
    a. **Gastrin:** ↑ Gastric acid secretion (from G cells).
    b. **Cholecystokinin (CCK):** ↑ Gallbladder contraction, ↓ gastric emptying, ↑ pancreatic enzyme secretion.
    c. **Secretin:** ↑ Bicarbonate secretion from pancreas and biliary tract, ↓ gastric acid.
    d. **VIP (Vasoactive Intestinal Peptide):** Causes **pancreatic cholera** (WDHA syndrome - Watery Diarrhea, Hypokalemia, Achlorhydria) in **VIPomas**.
37. **GI Secretions:**
    a. **Stomach:** HCl (parietal cells), Intrinsic Factor (parietal cells), Pepsinogen (chief cells).
    b. **Pancreas: Bicarbonate** (ductal cells), **Digestive enzymes** (acinar cells - amylase, lipase, proteases).
38. **GI Medications:**
    a. **PPIs (e.g., Omeprazole):** Irreversibly inhibit **H+/K+ ATPase**. Can cause *C. diff*, pneumonia, micronutrient deficiencies (B12, Mg, Ca).
    b. **Sulfasalazine:** Used for IBD. Can cause **oligospermia** and requires **folic acid supplementation**.
39. **Jaundice Pathophysiology:**
    a. **Pre-hepatic:** ↑ Unconjugated bilirubin (e.g., hemolysis).
    b. **Hepatic:** ↑ Both unconjugated and conjugated (e.g., hepatitis).
    c. **Post-hepatic:** ↑ Conjugated bilirubin (e.g., biliary obstruction). Dark urine, pale stools, pruritus.
40. **Liver Function Tests (LFTs) Pattern Recognition:**
    a. **Hepatocellular (e.g., Hepatitis): ↑↑ AST/ALT**.
    b. **Cholestatic (e.g., Obstruction, PBC): ↑↑ Alkaline Phosphatase & GGT**.
    c. **Isolated ↑ Bilirubin:** Think **Gilbert's** (mild ↑ unconjugated) or **Dubin-Johnson/Rotor** (↑ conjugated).
41. **Abdominal Hernias:**
    a. **Direct Inguinal:** Medial to Hesselbach's triangle, **acquired**.
    b. **Indirect Inguinal:** Through the **internal inguinal ring**, **congenital** (persistent processus vaginalis).
42. **Acute Cholecystitis:** Inflammation of the gallbladder, most often due to **gallstone obstruction** of the cystic duct. **Murphy's sign** is classic. Diagnose with **RUQ ultrasound**.

43. **Ascites:** In cirrhosis, due to portal hypertension and low albumin. **SAAG (Serum-Ascites Albumin Gradient)**:
    a. **SAAG ≥1.1 g/dL:** Portal hypertension (e.g., cirrhosis, CHF).
    b. **SAAG <1.1 g/dL:** Non-portal hypertension (e.g., peritoneal carcinomatosis, TB).
44. **Esophageal Cancer:**
    a. **Squamous Cell Carcinoma:** Upper/mid esophagus. Risk factors: alcohol, tobacco, achalasia.
    b. **Adenocarcinoma:** Lower esophagus. Risk factor: **Barrett's esophagus** from chronic GERD.
45. **Pancreatic Cancer: Adenocarcinoma** in the **head of the pancreas** is most common. Presents with **painless jaundice**, **Courvoisier's sign** (palpable gallbladder), weight loss. Poor prognosis.
46. **Gallstone Ileus:** Gallstone erodes through gallbladder into duodenum, causing **mechanical small bowel obstruction**. **Rigler's triad** on X-ray: pneumobilia, small bowel obstruction, ectopic gallstone.
47. **Hereditary Hemorrhagic Telangiectasia (Osler-Weber-Rendu):** Autosomal dominant. Causes **AVMs** in skin, mucous membranes, GI tract, lungs, liver. Presents with **epistaxis** and **GI bleeding**.
48. **Tropical Sprue:** Malabsorption syndrome after travel to tropics. Similar presentation to celiac but responds to **antibiotics (e.g., tetracycline)** and folate.
49. **Whipple's Disease:** Caused by ***Tropheryma whipplei***. Presents with **arthralgias, diarrhea, weight loss, neurological symptoms**. Biopsy shows **PAS-positive macrophages** in lamina propria.
50. **Ménétrier's Disease:** Hypertrophy of gastric rugae due to hyperplasia of mucus cells. Presents with **hypoproteinemia** from protein-losing gastropathy. Increased risk of gastric cancer.

Dermatology

Inflammatory & Autoimmune

1. **Psoriasis:** Well-demarcated, **erythematous plaques with silvery scale**. Common on **extensor surfaces** (elbows, knees), scalp. **Auspitz sign** (pinpoint bleeding when scale is removed). Associated with **psoriatic arthritis** (often involves DIP joints).

2. **Lichen Planus: "5 P's"**: **P**ruritic, **P**olygonal, **P**urple, **P**lanar (flat-topped) **P**apules. Often with **Wickham's striae** (reticular white lines on surface). Common on **flexor wrists** and **oral mucosa**.
3. **Atopic Dermatitis (Eczema): Pruritic, erythematous, scaly patches and plaques**. Associated with the **"atopic triad"** (eczema, asthma, allergic rhinitis). **Lichenification** (thickened skin) in chronic cases.
4. **Contact Dermatitis:**
    a. **Irritant:** From direct chemical injury (e.g., harsh soaps).
    b. **Allergic:** Type IV hypersensitivity (e.g., **poison ivy** [urushiol], nickel). Often linear or geometric pattern.
5. **Seborrheic Dermatitis: Erythematous plaques with yellow, greasy scales**. In **adults**: scalp (dandruff), face (nasolabial folds, eyebrows). In **infants**: "cradle cap." Associated with **Malassezia** yeast and **Parkinson's/HIV**.
6. **Acne Vulgaris:** Caused by *C. acnes*, increased sebum, follicular hyperkeratinization. **Comedones** (open=blackheads, closed=whiteheads), inflammatory papules/pustules/nodules.
7. **Pityriasis Rosea:** Herald patch followed by **"Christmas tree" distribution** of erythematous, scaly plaques on trunk and proximal extremities. Often follows a viral illness. Self-limited.
8. **Erythema Nodosum: Painful, red, subcutaneous nodules** on **anterior shins**. Associated with **Sarcoidosis**, IBD, Strep, drugs (OCPs, sulfa).
9. **Erythema Multiforme: Target lesions** with central blistering. Often triggered by **HSV** or *Mycoplasma*. **EM major** involves mucous membranes; **Stevens-Johnson Syndrome (SJS)** is more severe.
10. **Stevens-Johnson Syndrome (SJS) / Toxic Epidermal Necrolysis (TEN):** Severe mucocutaneous reaction with **skin detachment**. **SJS** (<10% BSA), **SJS/TEN overlap** (10-30%), **TEN** (>30%). High mortality. Common triggers: **drugs** (sulfa, anticonvulsants, allopurinol, NSAIDs).

Infectious

11. **Impetigo:** Superficial skin infection. **Honey-colored crusts**. Caused by *S. aureus* or *S. pyogenes*.
12. **Cellulitis vs. Erysipelas:**
    a. **Cellulitis:** Deeper infection (dermis/subQ), poorly demarcated, caused by *S. aureus* or *S. pyogenes*.
    b. **Erysipelas:** More superficial (upper dermis), **sharply demarcated**, bright red, raised. Often on face. Usually *S. pyogenes*.

13. **Necrotizing Fasciitis:** "Flesh-eating" infection. Severe pain, skin discoloration, crepitus. Surgical emergency. Often polymicrobial or *S. pyogenes*.
14. **Herpes Simplex Virus (HSV):** Grouped vesicles on an erythematous base. **HSV-1**: typically oral. **HSV-2**: typically genital. **Tzanck smear** shows multinucleated giant cells.
15. **Varicella-Zoster Virus (VZV):**
    a. **Chickenpox:** Diffuse vesicles in different stages ("dew drops on a rose petal").
    b. **Shingles: Dermatomal distribution** of painful vesicles. Reactivation from dorsal root ganglia.
16. **Tinea (Dermatophytosis):** Fungal infection. **KOH prep** shows hyphae.
    a. **Tinea corporis:** Body ("ringworm").
    b. **Tinea cruris:** Groin ("jock itch").
    c. **Tinea pedis:** Feet ("athlete's foot").
    d. **Tinea capitis:** Scalp. Can cause **kerion** (inflammatory boggy plaque).
17. **Candida:** Bright red plaques with **satellite pustules**. In intertriginous areas (diaper rash, under breasts). **Pseudohyphae** on KOH.
18. **Scabies:** Burrowing mite (*Sarcoptes scabiei*). **Intense pruritus**, worse at night. **Burrows** in web spaces, wrists, genitals. Treat with **permethrin**.
19. **Lyme Disease:** Caused by *Borrelia burgdorferi*. **Erythema migrans** rash: "bull's-eye" lesion with central clearing.

Vesiculobullous & Autoimmune Blistering

20. **Pemphigus Vulgaris: Autoantibodies against desmoglein 3 (Dsg3)** → **acantholysis**. **Flaccid bullae** that **rupture easily**, positive **Nikolsky sign**. **Suprabasal** blisters on biopsy. Oral mucosa often involved first.
21. **Bullous Pemphigoid: Autoantibodies against BP180** (hemidesmosomes in basement membrane). **Tense bullae** that do **not rupture easily**, negative Nikolsky sign. **Subepidermal** blisters on biopsy. Less mucosal involvement.
22. **Dermatitis Herpetiformis:** Extremely pruritic, grouped vesicles on **extensor surfaces** (elbows, knees, buttocks). **Cutaneous manifestation of Celiac Disease**. **IgA deposits in dermal papillae** on biopsy.

Drug Reactions & Systemic Disease Associations

23. **Fixed Drug Eruption:** Reappears in the **exact same location** every time the drug is taken. Often **round, sharply demarcated, violaceous plaque**.

24. **Drug-Induced Lupus:** Causes: **Hydralazine, Procainamide, Isoniazid**. Presents with malar rash, arthritis, serositis. **Anti-histone antibodies**.
25. **Systemic Lupus Erythematosus (SLE): Malar rash** (spares nasolabial folds), **discoid rash**, photosensitivity.
26. **Dermatomyositis: Heliotrope rash** (violaceous eyelids), **Gottron's papules** (over MCPs, PIPs), **shawl sign**, **mechanic's hands**. Associated with **malignancy**.
27. **Scleroderma/Systemic Sclerosis:**
    a. **Limited (CREST): C**alcinosis, **R**aynaud's, **E**sophageal dysmotility, **S**clerodactyly, **T**elangiectasias.
    b. **Diffuse:** Truncal involvement, rapid progression to **scleroderma renal crisis**.
28. **Sarcoidosis:** Cutaneous manifestations: **erythema nodosum**, **lupus pernio** (violaceous plaques on nose/cheeks), non-caseating granulomas on biopsy.

Benign & Malignant Neoplasms

29. **Seborrheic Keratosis:** "Stuck-on" appearance, waxy, verrucous plaques. **Sign of Leser-Trélat** is the sudden eruption of many SKs, associated with **internal malignancy** (especially GI adenocarcinoma).
30. **Actinic Keratosis: Pre-malignant** scaly, erythematous macules/patches on **sun-exposed** skin. Due to chronic UV exposure. Can progress to **SCC**.
31. **Basal Cell Carcinoma (BCC): Most common skin cancer**. **Pearly, telangiectatic papule/nodule**, often with rolled borders. **Rarely metastasizes**. Strongly associated with **UVB exposure**.
32. **Squamous Cell Carcinoma (SCC): Erythematous, scaly plaque or nodule**, may ulcerate. Can **metastasize**. Risk factors: chronic sun exposure, immunosuppression, **arsenic exposure**.
33. **Malignant Melanoma: ABCDEs**: **A**symmetry, **B**order irregularity, **C**olor variation, **D**iameter >6mm, **E**volving. Prognosis based on **Breslow depth**. Superficial Spreading is most common type.
34. **Kaposi Sarcoma:** Caused by **HHV-8**. Purple/violaceous macules, plaques, nodules. Associated with **AIDS** and immunosuppression.

Pediatric & Genetic

35. **Atopic Dermatitis:** Most common in **childhood**.
36. **Hemangioma:** Benign vascular tumor. **Strawberry appearance**. **Proliferates** in first year of life, then **involutes**.

37. **Port-Wine Stain:** Capillary malformation (not a tumor). Present at birth, **does not involute**. Associated with **Sturge-Weber syndrome** (ipsilateral facial PWS + leptomeningeal angiomas + seizures).
38. **Neurofibromatosis Type 1 (NF1): Café-au-lait spots** (>6, >5mm prepubertal), axillary/inguinal freckling, neurofibromas, Lisch nodules.
39. **Tuberous Sclerosis: Adenoma sebaceum** (facial angiofibromas), **ash-leaf spots** (hypopigmented macules), shagreen patches, seizures, intellectual disability.
40. **Ehlers-Danlos Syndrome:** Defect in collagen synthesis → hyperextensible skin, hypermobile joints, easy bruising, poor wound healing.

Miscellaneous High-Yield

41. **Nikolsky Sign:** Skin sloughs with lateral pressure. Positive in **Pemphigus Vulgaris**, **SJS/TEN**, **Staphylococcal Scalded Skin Syndrome (SSSS)**.
42. **Staphylococcal Scalded Skin Syndrome (SSSS):** Caused by *S. aureus* exfoliative toxin. **Widespread erythema and desquamation** (like a scald). **Nikolsky sign positive**. **Cleavage plane is superficial (granular layer)**, unlike TEN (dermo-epidermal junction).
43. **Vitiligo: Autoimmune destruction of melanocytes** → depigmented macules/patches. Associated with other autoimmune diseases (e.g., Hashimoto's, Addison's).
44. **Urticaria (Hives):** Wheals (transient, edematous papules/plaques) due to **mast cell degranulation** and histamine release. Can be allergic or idiopathic.
45. **Alopecia Areata:** Well-circumscribed, round patches of non-scarring hair loss. "Exclamation point" hairs at periphery. Autoimmune.
46. **Rosacea:** Facial erythema, telangiectasias, papules, pustules. Triggers: sun, heat, alcohol, spicy food. Can cause **rhinophyma** (bulbous nose).
47. **Acanthosis Nigricans:** Velvety, hyperpigmented plaques in flexures (neck, axilla). Marker for **insulin resistance** and **internal malignancy** (especially gastric adenocarcinoma).
48. **Pyoderma Gangrenosum:** Rapidly progressing, painful ulcer with **undermined, violaceous border**. Associated with **IBD**, RA, hematologic malignancies. **Pathergy** common.
49. **Lichen Sclerosus: Porcelain-white, atrophic plaques**, often on **vulva or perianal** region. Can cause scarring. Increased risk of **SCC**.
50. **Hidradenitis Suppurativa:** Chronic, inflammatory condition of **hair follicles** in intertriginous areas (axilla, groin). Presents with recurrent painful nodules, abscesses, sinus tracts, scarring. Associated with **smoking and obesity**.

Infectious Disease

Bacteriology

1. **Gram-Positive Cocci:**
    a. ***Staphylococcus aureus***: Coagulase-positive. Causes skin/soft tissue infections, osteomyelitis, toxic shock syndrome (TSST-1). **MRSA** is resistant to beta-lactams.
    b. ***Streptococcus pyogenes*** (Group A): Causes pharyngitis, impetigo. Post-infectious: **rheumatic fever** (ASO titer) & **acute glomerulonephritis**.
    c. ***Streptococcus agalactiae*** (Group B): Major cause of **neonatal meningitis and sepsis**. Screen pregnant women at 35-37 weeks.
2. **Gram-Negative Cocci:**
    a. ***Neisseria meningitidis***: Causes meningitis with **petechial/purpuric rash**. Vaccine available.
    b. ***Neisseria gonorrhoeae***: Causes gonorrhea, PID, disseminated infection (arthritis-dermatitis). **Requires chocolate or Thayer-Martin agar**.
3. **Gram-Positive Rods:**
    a. ***Clostridium tetani***: Toxin causes **spastic paralysis** (lockjaw). Prevent with tetanus toxoid vaccine.
    b. ***Clostridium difficile***: Causes **antibiotic-associated pseudomembranous colitis**. Treat with **oral vancomycin** or fidaxomicin.
    c. ***Bacillus anthracis***: **Cutaneous** (black eschar), **inhalational** (widened mediastinum).
    d. ***Listeria monocytogenes***: Causes meningitis in **newborns, pregnant women, immunocompromised**. Treat with **Ampicillin**.
4. **Gram-Negative Rods:**
    a. ***Pseudomonas aeruginosa***: Causes infections in **CF, burns, neutropenia**. Green-blue pigment (pyocyanin).
    b. ***Haemophilus influenzae***: Causes epiglittitis, otitis media. **Type B (Hib)** prevented by vaccine.
    c. ***Legionella pneumophila***: Atypical pneumonia from **aerosolized water**. Diagnose with **urinary antigen**. Can cause **hyponatremia**.

Virology

5. **Herpesviruses:**

    a. **HSV-1/2:** Grouped vesicles. **Tzanck smear** shows multinucleated giant cells.
    b. **VZV:** Chickenpox (diffuse vesicles), Shingles (dermatomal).
    c. **EBV:** Mononucleosis. **Heterophile antibodies (Monospot)**, atypical lymphocytes. Associated with Burkitt lymphoma.
    d. **CMV:** Congenital infection, disease in immunocompromised. **Owl's eye inclusions**.
6. **Hepatitis Serology:**
    a. **Hep B: HBsAg+ = infection. Anti-HBs+ = immunity. Anti-HBc IgM = acute infection.**
    b. **Hep C:** Major cause of chronic hepatitis, cirrhosis, HCC. **No vaccine**. Treat with DAAs.
7. **HIV:** Targets **CD4+ T-cells**. Diagnose with ELISA -> Western Blot. Stage with CD4/viral load.
8. **Influenza:** Types A (pandemics) and B. **Antigenic shift** (major change) vs. **drift** (minor change).
9. **RSV:** Most common cause of **bronchiolitis and pneumonia in infants**.
10. **Measles (Rubeola): Koplik spots**, maculopapular rash. Can cause **SSPE** years later.
11. **Rubella (German Measles):** Teratogenic → **Congenital Rubella Syndrome** (cataracts, cardiac defects, deafness).

Fungi & Parasites

12. ***Candida albicans***: Causes thrush, vaginitis. **Pseudohyphae** on KOH.
13. ***Aspergillus***: Causes **aspergilloma** (fungus ball), **ABPA**, invasive aspergillosis.
14. Endemic Fungi:
    a. ***Coccidioides***: Southwest US. "Valley Fever."
    b. ***Histoplasma***: Ohio/Mississippi valleys. **Bird/bat droppings**.
    c. ***Cryptococcus***: Causes meningitis in **AIDS**. **Heavily encapsulated yeast**; **India ink**, CSF antigen.
15. **Malaria:** *Plasmodium*. Vector: *Anopheles* mosquito. **P. falciparum** is most severe. Diagnose with **blood smear**.
16. **Giardia:** Causes bloating, foul-smelling diarrhea, malabsorption. **Cysts in water**.
17. ***Entamoeba histolytica***: Causes amoebic dysentery, **liver abscess** ("anchovy paste").
18. ***Toxoplasma gondii***: Causes **ring-enhancing brain lesions in AIDS**. **Cat is definitive host**.

Clinical Syndromes & Management

19. **Meningitis:**
    a. **Bacterial:** High WBC, low glucose, high protein. Empiric therapy: **Vancomycin + 3rd Gen Cephalosporin (Ceftriaxone)**.
    b. **Viral:** Lymphocytic WBC, normal glucose.
20. **Pneumonia:**
    a. **Community-Acquired (CAP):** *S. pneumoniae* (#1 typical), *Mycoplasma* (#1 atypical).
    b. **Hospital-Acquired (HAP):** *Pseudomonas*, MRSA.
21. **UTI:** *E. coli* is #1 cause.
22. **Infective Endocarditis: S. aureus** (#1 overall, IV drug users). **Viridans Strep** (native valve). **Osler nodes, Janeway lesions, Roth spots**.
23. **Osteomyelitis: S. aureus** is #1 cause.
24. **Sexually Transmitted Infections (STIs):**
    a. **Chancre:** Primary Syphilis.
    b. **Painless ulcer:** Syphilis.
    c. **Painful ulcer:** HSV, Chancroid.
25. **Zoonotic Bacteria:**
    a. ***Borrelia burgdorferi***: Lyme disease. Vector: *Ixodes* tick. **Erythema migrans** rash.
    b. ***Rickettsia rickettsii***: Rocky Mountain Spotted Fever. **Rash on palms/soles**.

Antimicrobials & Key Concepts

26. **Cell Wall Synthesis Inhibitors: Beta-lactams** (Penicillins, Cephalosporins), **Vancomycin**.
27. **Protein Synthesis Inhibitors:**
    a. **30S:** Aminoglycosides (bactericidal), Tetracyclines (bacteriostatic).
    b. **50S:** Macrolides, Clindamycin.
28. **Folate Synthesis Inhibitors: Trimethoprim-Sulfamethoxazole (TMP-SMX)**. Used for *Pneumocystis jirovecii* (PCP).
29. **Antimicrobial Side Effects:**
    a. **Aminoglycosides:** Nephrotoxicity, Ototoxicity.
    b. **Fluoroquinolones:** Tendon rupture, QT prolongation.
    c. **Vancomycin:** "Red Man Syndrome," Nephrotoxicity.
    d. **Amphotericin B:** "Ampho-terrible" - Nephrotoxicity.
    e. **Chloramphenicol:** Gray baby syndrome, Aplastic anemia.

f. **Macrolides:** QT prolongation.
g. **Tetracyclines:** Tooth discoloration, photosensitivity.
h. **Metronidazole:** Disulfiram-like reaction with alcohol.
i. **Sulfa drugs:** Stevens-Johnson syndrome, hyperkalemia.

30. **Vaccines:**
    a. **Live-attenuated (contraindicated in pregnancy/immunocompromised):** MMR, Varicella.
    b. **Killed/Inactivated:** Influenza (shot), Polio (Salk).
    c. **Toxoid:** Tetanus, Diphtheria.
    d. **Conjugate:** *H. influenzae* type b (Hib), Pneumococcal (PCV13).

High-Yield Organism-Antibiotic Pairings

31. ***Mycoplasma pneumoniae***: Treat with **Macrolides (e.g., Azithromycin)** or **Doxycycline**.
32. ***Chlamydia trachomatis***: Treat with **Azithromycin** or **Doxycycline**.
33. ***Pseudomonas aeruginosa***: Treat with **Antipseudomonal Penicillin (e.g., Piperacillin-tazobactam)** or **Carbapenem (e.g., Meropenem)** + **Aminoglycoside**.
34. **MRSA:** Treat with **Vancomycin**, **Daptomycin**, or **Linezolid**.
35. ***Clostridium difficile***: Treat with **Oral Vancomycin** or **Fidaxomicin**.
36. ***Treponema pallidum*** (Syphilis): Treat with **Penicillin G**.
37. ***Mycobacterium tuberculosis***: Initial regimen: **RIPE** (Rifampin, Isoniazid, Pyrazinamide, Ethambutol).

Miscellaneous Must-Know Facts

38. **Asplenia:** Increased risk of **encapsulated organisms** (*S. pneumoniae, H. influenzae, N. meningitidis*).
39. **Cystic Fibrosis:** Lung infections with ***Pseudomonas aeruginosa*** and ***Staphylococcus aureus***.
40. **Sickle Cell Disease:** Functional asplenia → increased risk of ***Salmonella* osteomyelitis** and encapsulated organisms.
41. **IV Drug Use:** Increased risk of **S. aureus** endocarditis (especially tricuspid valve), and **Hepatitis B/C**.
42. **Relative Bradycardia:** Pulse is slow relative to fever. Seen in **Typhoid Fever, Legionella, Psittacosis, Dengue**.
43. **"Atypical" Pneumonia:** *Mycoplasma, Chlamydia pneumoniae, Legionella*. Often subacute with extrapulmonary symptoms.

44. **Virulence Factors:**
    a. **Protein A** (*S. aureus*): Binds Fc region of IgG, preventing opsonization.
    b. **M protein** (*S. pyogenes*): Anti-phagocytic.
45. **Nosocomial Infections:**
    a. **Hospital-Acquired Pneumonia (HAP):** >48h after admission.
    b. **Ventilator-Associated Pneumonia (VAP):** >48h after intubation.
46. **Fever Patterns:**
    a. **Hectic/Spiking:** Abscess.
    b. **Intermittent:** Bacteremia, Malaria.
47. **Watery Diarrhea:** *Vibrio cholerae, ETEC*. Toxin increases cAMP → secretion.
48. **Inflammatory/Bloody Diarrhea:** *Shigella, Salmonella, Campylobacter, EHEC*. Invades mucosa.
49. **EHEC (e.g., O157:H7):** Causes **bloody diarrhea** and **HUS**. **Avoid antibiotics** (can increase toxin release).
50. ***Helicobacter pylori***: Causes PUD. Diagnose with urea breath test. Treat with **PPI + Clarithromycin + Amoxicillin/Metronidazole (Triple Therapy)**.

Rheumatology

Rheumatoid Arthritis (RA)

1. **RA** is a chronic, systemic **autoimmune** disorder causing **symmetrical inflammatory polyarthritis** of **small joints** (MCPs, PIPs, wrists).
2. Classic presentation: **Morning stiffness >1 hour** that improves with activity.
3. **Rheumatoid Factor (RF)** is an IgM autoantibody; sensitive but not specific.
4. **Anti-CCP (ACPA)** is **more specific** for RA and often appears earlier.
5. Extra-articular manifestations: **Rheumatoid nodules**, pleuritis, pericarditis, vasculitis.
6. First-line DMARD: **Methotrexate**. TNF-alpha inhibitors (e.g., Adalimumab) are first-line biologics.

Seronegative Spondyloarthropathies

7. **Seronegative Spondyloarthropathies** are linked to **HLA-B27** and feature **sacroiliitis, enthesitis**, and **negative RF**.

8. **Ankylosing Spondylitis (AS):** Inflammatory back pain, "bamboo spine." Extra-articular: **Acute anterior uveitis** (most common), aortitis.
9. **Reactive Arthritis:** Triad: **Conjunctivitis, Urethritis, Arthritis** ("Can't see, can't pee, can't climb a tree"). Often triggered by GI/GU infections.
10. **Psoriatic Arthritis:** Can cause **dactylitis ("sausage digits")**, **asymmetric oligoarthritis**, and **nail pitting/onycholysis**.

Systemic Lupus Erythematosus (SLE)

11. **ANA** is highly sensitive (>95%) but not specific for SLE. A negative ANA makes SLE very unlikely.
12. **Anti-dsDNA** and **Anti-Smith (Anti-Sm)** are **highly specific** for SLE. Anti-dsDNA correlates with disease activity (especially nephritis).
13. **Diagnostic Criteria (ACR):** Need 4 of 11. High-yield ones: **Malar rash** (spares nasolabial folds), **Discoid rash**, **Photosensitivity**, **Oral ulcers**, **Arthritis**, **Serositis**, **Renal disorder**, **Neurologic disorder**.
14. **Drug-Induced Lupus:** Caused by **Hydralazine, Procainamide, Isoniazid**. Presents with fever, rash, arthritis. **Anti-Histone antibodies** are classic. **Renal/CNS disease is rare**.

Scleroderma & Inflammatory Myopathies

15. **Systemic Sclerosis (Scleroderma): CREST syndrome** is the limited form: **C**alcinosis, **R**aynaud's, **E**sophageal dysmotility, **S**clerodactyly, **T**elangiectasias.
16. **Diffuse Scleroderma** has a high risk of **Scleroderma Renal Crisis** (malignant hypertension, AKI). Treat with **ACE inhibitors**.
17. **Anti-Scl-70 (Topoisomerase I)** is associated with **diffuse scleroderma** and pulmonary fibrosis.
18. **Anti-Centromere** antibody is associated with **limited (CREST) scleroderma**.
19. **Dermatomyositis: Heliotrope rash** (violaceous eyelids), **Gottron's papules** (over MCPs). Strongly associated with **malignancy**.
20. **Polymyositis:** Proximal muscle weakness **without** the classic skin rash of dermatomyositis.

Vasculitides (Classified by Vessel Size)

21. **Giant Cell (Temporal) Arteritis:** Patients **>50**. Headache, jaw claudication, **visual loss (emergency)**. **Markedly elevated ESR/CRP**. Treat with **high-dose steroids immediately**.
22. **Takayasu Arteritis:** "Pulseless disease." Affects **young women (<40)**. Involves aortic arch and its branches.
23. **Polyarteritis Nodosa (PAN):** Affects **medium vessels**. Causes **renal vascular hypertension**, mononeuritis multiplex, GI involvement. Associated with **Hepatitis B**.
24. **Granulomatosis with Polyangiitis (GPA, Wegener's):** Triad: **Upper & lower respiratory tract granulomas + necrotizing glomerulonephritis**. **c-ANCA (PR3-ANCA)** positive.
25. **Microscopic Polyangiitis (MPA): Necrotizing glomerulonephritis + pulmonary capillaritis**. **p-ANCA (MPO-ANCA)** positive.
26. **Eosinophilic Granulomatosis with Polyangiitis (EGPA, Churg-Strauss):** Triad: **Asthma, eosinophilia, vasculitis**. **p-ANCA (MPO-ANCA)** positive in ~50%.

Crystal-Induced Arthropathies

27. **Gout:** Deposition of **monosodium urate** crystals. Presents as an acute, exquisitely painful **monoarthritis** (often **1st MTP - podagra**).
28. **Gout Diagnosis:** Joint aspiration shows **negatively birefringent, needle-shaped crystals** under polarized light.
29. **Acute Gout Treatment:** NSAIDs, Colchicine, Steroids. **Do NOT start allopurinol during an acute flare**.
30. **Pseudogout:** Deposition of **calcium pyrophosphate (CPPD)** crystals. Affects **knees**. Crystals are **weakly positively birefringent, rhomboid-shaped**. X-ray may show **chondrocalcinosis**.

Other Key Conditions & Facts

31. **Osteoarthritis (OA): Non-inflammatory**, "wear-and-tear." Pain **worsens with activity**, better with rest. Affects **DIPs (Heberden's nodes)** and **PIPs (Bouchard's nodes)**.
32. **Sjögren's Syndrome:** Autoimmune destruction of exocrine glands → **dry eyes (keratoconjunctivitis sicca)** and **dry mouth (xerostomia)**. Associated with **Anti-Ro (SS-A)** and **Anti-La (SS-B)** antibodies.

33. **Antiphospholipid Syndrome (APS): Arterial/venous thrombosis + recurrent pregnancy loss** with **Lupus Anticoagulant, Anti-Cardiolipin, or Anti-β2-Glycoprotein I antibodies**. Treat with **lifelong anticoagulation**.
34. **Polymyalgia Rheumatica (PMR):** Patients **>50** with **pain/stiffness in shoulder and hip girdles**. **Markedly elevated ESR/CRP**. Closely linked with **Giant Cell Arteritis**.
35. **Fibromyalgia:** Widespread **musculoskeletal pain**, fatigue, sleep disturbance, cognitive dysfunction ("fibro fog"). **Tender points** on exam. Diagnosis is clinical.

Pharmacology

36. **Methotrexate:** First-line DMARD for RA. Side effect: **myelosuppression, hepatotoxicity, pulmonary fibrosis**. Patients must take **folic acid** to reduce toxicity.
37. **Allopurinol:** Xanthine oxidase inhibitor for chronic gout management. Risk of **severe rash (SJS/TEN)**, especially in renal impairment and when started during an acute flare.
38. **Colchicine:** Used for acute gout and prophylaxis. Side effect: **GI upset (diarrhea)**. Can cause **myotoxicity** when combined with statins.
39. **Corticosteroids:** Major long-term side effects: osteoporosis, avascular necrosis, cataracts, glucose intolerance, immunosuppression.
40. **NSAIDs:** Work by inhibiting cyclooxygenase (COX). Side effects: GI ulceration, renal toxicity, increased cardiovascular risk.

Diagnostic Tests & Findings

41. **Synovial Fluid Analysis:**
    a. **Non-inflammatory (OA):** WBC <2000/µL.
    b. **Inflammatory (RA, gout):** WBC 2,000-50,000/µL.
    c. **Septic:** WBC >50,000/µL (often >100,000).
42. **Raynaud's Phenomenon:** Vasospasm causing color changes (white → blue → red).
    a. **Primary:** Idiopathic, benign.
    b. **Secondary:** Associated with scleroderma, SLE, RA.
43. **Livedo Reticularis:** A mottled, net-like discoloration of the skin. Can be seen in **SLE, APS, PAN**.
44. **Synovial Biopsy:** Shows **pannus formation** in RA.

Pediatric & Miscellaneous

45. **Juvenile Idiopathic Arthritis (JIA):** Arthritis in a child <16 years old for >6 weeks.
    a. **Systemic (Still's disease):** High fevers, salmon-colored rash, serositis.
46. **Lyme Disease:** Caused by *Borrelia burgdorferi*. Stage 1: **Erythema migrans** (bull's-eye rash). Late stage: arthritis, often of the **knee**.
47. **Sarcoidosis:** Can cause an **acute arthritis** with **erythema nodosum** and **bilateral hilar lymphadenopathy (Löfgren's syndrome)**—this presentation has a good prognosis.
48. **Behçet's Disease:** Triad: **Recurrent oral aphthous ulcers, genital ulcers, uveitis**. **Pathergy** is a classic finding.
49. **Hypertrophic Osteoarthropathy: Clubbing, periostitis, arthritis**. Associated with **lung cancer** and other intrathoracic malignancies.
50. **Relapsing Polychondritis:** Inflammation of cartilage. Presents with **auricular chondritis** (painful, red ears), saddle nose deformity, tracheal collapse.

Surgery

Trauma & Shock

1. **Advanced Trauma Life Support (ATLS) Primary Survey: A**BCDE: **A**irway (with C-spine protection), **B**reathing, **C**irculation, **D**isability (Neurologic status), **E**xposure/Environment.
2. **Tension Pneumothorax:** Clinical diagnosis: **Hypotension, tracheal deviation AWAY from affected side, absent breath sounds, JVD**. Treat with **immediate needle decompression** (2nd intercostal space, midclavicular line) followed by chest tube.
3. **Cardiac Tamponade: Beck's Triad:** Hypotension, JVD, **muffled heart sounds**. **Pulsus paradoxus**. Ultrasound is diagnostic. Treat with **emergent pericardiocentesis**.
4. **Hemothorax:** Diagnosed by **supine CXR showing hazy hemithorax**. Treat with **chest tube placement**. If output >1500 mL initially or >200 mL/hr for 4 hours → **OR for thoracotomy**.
5. **Flail Chest:** Paradoxical chest wall movement from ≥2 rib fractures in ≥2 places. Underlying **pulmonary contusion** is the primary cause of hypoxia.

6. **Aortic Disruption (Traumatic):** Most common at **ligamentum arteriosum (just after left subclavian artery)**. Widened mediastinum on CXR. Diagnose with CT angiogram.
7. **Solid Organ Injury (Spleen, Liver): FAST exam** is initial test. **Unstable** patients go directly to OR. **Stable** patients can be managed non-operatively with serial exams/imaging.
8. **Spleenic Injury:** Most common organ injured in blunt abdominal trauma. Preserve spleen if possible (especially in children) due to risk of **OPSI (Overwhelming Post-Splenectomy Sepsis)** from encapsulated organisms.
9. **Duodenal Hematoma:** Often from child abuse (seat-belt injury, bicycle handlebar). Presents with abdominal pain and bilious vomiting after trauma. "**Coiled spring**" sign on UGI series.
10. **Shock Types:**
    a. **Hypovolemic:** ↓ Preload, ↑ SVR, ↓ CO. Treat with fluids/blood.
    b. **Cardiogenic:** ↑ Preload (JVD), ↑ SVR, ↓ CO. Treat underlying cause.
    c. **Distributive (Septic, Neurogenic, Anaphylactic):** ↓ SVR, ↑ CO (warm shock).
    d. **Obstructive (Tamponade, Tension PTX, PE):** ↑ Preload (JVD), ↓ CO.

Gastrointestinal Surgery

11. **Appendicitis: McBurney's point** pain. **Rovsing's sign** (RLQ pain with LLQ palpation). **Psoas sign** (pain with hip extension). Treatment: **appendectomy**.
12. **Small Bowel Obstruction (SBO): Colicky pain, distention, vomiting, obstipation**. **Dilated small bowel loops >3 cm**, air-fluid levels on X-ray. Most common cause: **postoperative adhesions**.
13. **Large Bowel Obstruction (LBO):** Most common cause: **cancer**. **Cecal diameter >12 cm** on X-ray is risk for **cecal perforation**. "**Closed-loop obstruction**" is a surgical emergency (e.g., volvulus).
14. **Sigmoid Volvulus:** Elderly, debilitated patients. **"Bent inner tube" or "omega loop" sign** on AXR. Treat with **sigmoidoscopy decompression**, then elective resection.
15. **Diverticulitis:** LLQ pain, fever, leukocytosis. **Hinchey Classification** for perforation. Uncomplicated cases: bowel rest, antibiotics. Complicated (abscess, perforation, fistula): may require surgery.
16. **Acute Mesenteric Ischemia: "Pain out of proportion to exam."** Atrial fibrillation is a common risk factor (embolus to SMA). **Lactic acidosis**. High mortality.
17. **Acute Cholecystitis:** RUQ pain, fever, +**Murphy's sign**. US shows **gallstones, wall thickening, pericholecystic fluid**. Treat with **cholecystectomy**.

18. **Ascending Cholangitis: Charcot's Triad:** RUQ pain, **fever/chills**, **jaundice**. **Reynolds' Pentad** adds **hypotension and AMS**. Medical emergency. Treat with **IV antibiotics + ERCP** for decompression.
19. **Acute Pancreatitis: Epigastric pain radiating to back**. Most common causes: **Gallstones & EtOH**. **Ranson's Criteria** predict mortality. Treat with NPO, IV fluids, pain control.
20. **Necrotizing Pancreatitis: Contrast-enhanced CT** is diagnostic. Infected necrosis requires **antibiotics and possible drainage/debridement**.
21. **Perforated Peptic Ulcer: Sudden, severe epigastric pain**. **Free air under diaphragm on upright CXR**. Treat with **laparoscopic Graham patch** (omental patch).
22. **Inguinal Hernia:**
    a. **Indirect:** Through **internal inguinal ring** (lateral to inferior epigastric vessels). Due to **patent processus vaginalis**. More common.
    b. **Direct:** Through **Hesselbach's triangle** (medial to inferior epigastric vessels). Acquired weakness.
23. **Strangulated Hernia:** Surgical emergency. Signs: pain, tenderness, erythema, **irreducibility**, systemic toxicity.
24. **Hemorrhoids:**
    a. **Internal:** Above dentate line, **painless** bleeding.
    b. **External:** Below dentate line, **painful** if thrombosed.
25. **Pilonidal Disease:** Sinus/tract in **natal cleft**. Treat with incision & drainage for abscess, excision for chronic disease.

Endocrine & Breast Surgery

26. **Thyroid Nodule Workup:** First test: **Thyroid-stimulating Hormone (TSH)**. If low → RAIU scan. If normal/high → **Ultrasound + FNA biopsy**.
27. **Thyroid Cancer:**
    a. **Papillary:** Most common. **Orphan Annie eyes, Psammoma bodies**. Excellent prognosis.
    b. **Medullary:** From **parafollicular C-cells**. Produces **calcitonin**. Associated with **MEN 2A/B**.
28. **Hyperparathyroidism: High Ca^{2+}, low PO_4^{3-}, high PTH**. **Primary:** adenoma. **Secondary:** renal disease. **Tertiary:** autonomous secretion after long-term secondary. Treat with **parathyroidectomy**.
29. **Acute Appendicitis in Pregnancy:** Appendix is displaced **upward and rightward**. Most common non-obstetric reason for surgery in pregnancy.

30. **Breast Cancer Risk Factors: Early menarche, late menopause, nulliparity, late first pregnancy, family history, BRCA1/2 mutations**.
31. **Triple Assessment for Breast Mass: Physical exam, Imaging (mammogram/US), Biopsy (FNA/core)**.
32. **Inflammatory Breast Cancer: Peau d'orange** (edematous skin), erythema, warmth. Often **no discrete mass**. Poor prognosis.
33. **Paget's Disease of the Breast: Eczematous changes of nipple/areola** from ductal carcinoma. Associated with underlying malignancy.

Vascular Surgery

34. **Abdominal Aortic Aneurysm (AAA):** Risk of rupture correlates with size (>5 cm). **Ultrasound** is screening test. **CT angiogram** for pre-op planning. **Elective repair** for >5.5 cm in men.
35. **Ruptured AAA:** Triad: **Hypotension, pulsatile abdominal mass, back/abdominal pain**. **Unstable** patients go directly to OR. **Stable** patients get CT.
36. **Acute Limb Ischemia: 6 P's: P**ain, **P**allor, **P**ulselessness, **P**aresthesia, **P**aralysis, **P**oikilothermia. **Paralysis and paresthesia are late signs** indicating irreversible damage.
37. **Deep Vein Thrombosis (DVT): Homan's sign** is unreliable. **Doppler US** is diagnostic. Treat with **anticoagulation**.
38. **Compartment Syndrome: Pain with passive stretch** is the earliest sign. Others: paresthesia, pallor, pulselessness (late). **Intracompartmental pressure >30 mmHg** is diagnostic. Treat with **emergent fasciotomy**.

Pre/Post-Op Care & Surgical Complications

39. **Surgical Risk Assessment: Goldman Cardiac Risk Index** for non-cardiac surgery.
40. **Bowel Anastomosis Leak:** Presents 5-7 days post-op with fever, tachycardia, peritonitis. **Water-soluble contrast study** is diagnostic.
41. **DVT Prophylaxis: SC Heparin, LMWH, SCDs**. For high-risk patients, continue for 4 weeks post-op.
42. **Wound Classification:**
    a. **Class I (Clean):** No inflammation, no break in technique (e.g., hernia repair). Infection risk: 1-2%.
    b. **Class II (Clean-Contaminated):** GI, GU, or respiratory tract entered without significant spillage (e.g., cholecystectomy). Risk: ~5-8%.

c. **Class III (Contaminated):** Open, fresh, accidental wounds; major break in technique; gross spillage from GI tract. Risk: ~15-20%.
d. **Class IV (Dirty-Infected):** Old traumatic wounds with devitalized tissue; existing clinical infection/perforation. Risk: ~40%.

43. **Surgical Site Infection (SSI):** Most common organism: ***Staphylococcus aureus***. Presents with erythema, pain, purulent discharge, fever.
44. **Incisional Hernia:** Most common complication of abdominal surgery. Risk factors: wound infection, obesity, malnutrition, smoking.
45. **Anastomotic Ulcer (Marginal Ulcer):** After gastric bypass, at gastrojejunal anastomosis. Caused by acid exposure without mucosal protection.
46. **Short Gut Syndrome:** After massive small bowel resection. Leads to malabsorption, diarrhea, electrolyte abnormalities. TPN-dependent.
47. **Bile Leak:** After cholecystectomy. Presents with abdominal pain, fever, bilious drainage. Diagnose with **HIDA scan**. Treat with **ERCP + stent**.
48. **Post-cholecystectomy Syndrome:** Persistent abdominal symptoms after cholecystectomy. Can be due to **Sphincter of Oddi dysfunction**, retained stone, or other causes.

Transplantation

49. **Hyperacute Rejection: Minutes to hours** after transplant. Due to **pre-formed antibodies**. Irreversible.
50. **Acute Rejection: Days to weeks/months**. T-cell mediated. Treatable with increased immunosuppression.
51. **Chronic Rejection: Months to years**. Fibrosis and vascular occlusion (e.g., graft arteriosclerosis). Irreversible.
52. **GVHD (Graft vs. Host Disease):** Donor T-cells attack host. **Acute:** skin rash, diarrhea, liver dysfunction. **Chronic:** scleroderma-like skin, sicca syndrome.

Oncologic Surgery

53. **TNM Staging: T**umor size/depth, **N**ode involvement, **M**etastasis.
54. **Sentinel Lymph Node Biopsy:** Used for melanoma and breast cancer. Identifies the first node(s) draining the tumor. If negative, spares patient full lymph node dissection.
55. **Tumor Lysis Syndrome:** After treatment of bulky, chemosensitive tumors (e.g., lymphoma, ALL). **Hyperuricemia, hyperkalemia, hyperphosphatemia,**

hypocalcemia. Can cause acute renal failure. Prevent with **allopurinol/rasburicase** and hydration.

56. **SVC Syndrome:** Often from lung cancer or lymphoma. Facial/upper extremity swelling, JVD, dyspnea. **Radiation** is first-line treatment.

Pediatric Surgery

57. **Pyloric Stenosis: Non-bilious projectile vomiting** in a **3-6 week old**. **Olive-shaped mass** in RUQ. **Hypochloremic, hypokalemic metabolic alkalosis**. US shows thickened pylorus. Treat with **pyloromyotomy (Ramstedt)**.
58. **Intussusception: Currant jelly stools**, colicky abdominal pain, vomiting, **sausage-shaped mass**. US shows "**target sign**." Treat with **air/enema reduction**.
59. **Hirschsprung's Disease: Absence of ganglion cells** in distal bowel (submucosal and myenteric plexus). Presents in newborns with **failure to pass meconium**, abdominal distention. **Rectal biopsy** is diagnostic.
60. **Meckel's Diverticulum: "Rule of 2's":** 2% of population, 2 feet from ileocecal valve, 2 inches long, 2 types of tissue (gastric/pancreatic), presents before age 2. Can cause **painless lower GI bleeding**.
61. **Malrotation & Volvulus:** Bilious vomiting in an infant. **"Double bubble" sign** on X-ray may be seen. **Surgical emergency** due to risk of midgut volvulus and necrosis.
62. **Biliary Atresia:** Presents with **progressive jaundice**, acholic stools, dark urine. **Hepatoportoenterostomy (Kasai procedure)** is initial treatment.
63. **Necrotizing Enterocolitis (NEC):** Premature infants. Abdominal distention, bloody stools, pneumatosis intestinalis on X-ray. Treat with NPO, antibiotics, surgery for perforation.

Other Key Surgical Principles

64. **Burns:**
    a. **Parkland Formula:** 4 mL LR × %TBSA × kg (1/2 in first 8h, 1/2 in next 16h).
    b. **"Rule of Nines":** Head=9%, Each arm=9%, Anterior trunk=18%, Posterior trunk=18%, Each leg=18%, Perineum=1%.
65. **Esophageal Atresia/TEF: Polyhydramnios**, choking/coughing/cyanosis with feeds. **Unable to pass NG tube**. Most common type: **proximal blind pouch with distal TEF**.
66. **Zenker's Diverticulum: Pulsion diverticulum** through Killian's dehiscence (above cricopharyngeus). **Dysphagia, halitosis, regurgitation of undigested food**. Barium swallow is diagnostic.

67. **Boerhaave's Syndrome: Full-thickness esophageal rupture** after vomiting. **Mackler's Triad:** vomiting, chest pain, subcutaneous emphysema. **Surgical emergency**.
68. **Mallory-Weiss Syndrome: Mucosal tear** at GE junction from vomiting. Presents with **hematemesis**.
69. **Sistrunk Procedure:** Treatment for **thyroglossal duct cyst**. Involves removal of the cyst, tract, and **central portion of the hyoid bone** to prevent recurrence.
70. **Whipple Procedure (Pancreaticoduodenectomy):** For pancreatic head cancer. Removes pancreatic head, duodenum, gallbladder, distal stomach, proximal jejunum.
71. **Hartmann's Procedure: Sigmoid colectomy with end colostomy and rectal stump**. For perforated diverticulitis, obstructing cancer, or trauma. **Reversal is a second major surgery**.
72. **Low Anterior Resection (LAR):** For rectal cancer. Anastomosis is created in the pelvis. Risk of **anastomotic leak** and damage to pelvic nerves (impotence, urinary retention).
73. **Abdominoperineal Resection (APR):** For very low rectal cancers. Requires **permanent end colostomy**.
74. **Roux-en-Y Gastric Bypass (RYGB):** Gold standard bariatric surgery. Creates a small gastric pouch and a Roux limb. **Dumping syndrome** is a common complication.
75. **Sleeve Gastrectomy:** Removes ~80% of stomach. Lower risk of micronutrient deficiencies than RYGB.

Critical Care & Fluids/Electrolytes

76. **SIADH:** Common post-op (especially cranial, pulmonary). **Euvolemic hyponatremia**. Treat with **fluid restriction**.
77. **Adrenal Insufficiency (Addisonian Crisis):** Can be precipitated by surgery in a steroid-dependent patient. Presents with **hypotension, hyponatremia, hyperkalemia**. Treat with **IV hydrocortisone**.
78. **Abdominal Compartment Syndrome:** Intra-abdominal pressure >20 mmHg. Causes oliguria, respiratory failure, hypotension. Treat with **decompressive laparotomy**.
79. **Fistula:** Abnormal connection between two epithelialized surfaces. High-output fistulas (>500 mL/day) cause significant fluid/electrolyte losses. Treat with NPO, TPN, control sepsis.

80. **Enterocutaneous Fistula:** Most common after abdominal surgery. **"FRIENDS"** factors: **F**oreign body, **R**adiation, **I**nfection/inflammation, **E**pithelialization, **N**eoplasm, **D**istal obstruction, **S**teroids.

Surgical Pharmacology

81. **Warfarin Reversal: Vitamin K** (slow), **FFP or PCC** (urgent).
82. **Heparin-Induced Thrombocytopenia (HIT): ↓ Platelets 5-10 days after starting heparin**. Paradoxical **thrombosis**. Diagnose with **anti-PF4 antibodies**. Treat by **stopping all heparin** and using a direct thrombin inhibitor (e.g., argatroban).
83. **Vancomycin-Resistant Enterococcus (VRE):** Common in ICU/hospitalized patients. Treat with **Linezolid or Daptomycin**.

Anatomy & Operative Injuries

84. **Cholecystectomy Injury:** Most common serious injury is to the **Common Bile Duct**.
85. **Thyroidectomy Injury:**
    a. **Recurrent Laryngeal Nerve: Hoarseness** (unilateral), **stridor** (bilateral).
    b. **Superior Laryngeal Nerve (external branch):** Loss of high-pitched voice.
    c. **Parathyroid Glands: Hypocalcemia** (tingling, Chvostek's/Trousseau's signs).
86. **Inguinal Hernia Repair Injury: Femoral nerve** (passes deep to inguinal ligament) can be injured, causing quadriceps weakness.
87. **Splenectomy:** Post-op complications: **Thrombocytosis**, **OPSI**. Vaccinate against encapsulated organisms (*S. pneumoniae, H. influenzae, N. meningitidis*).

Miscellaneous High-Yield Facts

88. **Fournier's Gangrene:** Necrotizing fasciitis of perineum. Polymicrobial. **Surgical emergency** requiring broad-spectrum antibiotics and **aggressive debridement**.
89. **Necrotizing Fasciitis:** "Flesh-eating" infection. Skin may have **bullae, crepitus, dusky discoloration**. **Surgical emergency**. Organisms: *S. pyogenes* (Type II) or polymicrobial (Type I).
90. **Ogilvie's Syndrome: Acute colonic pseudo-obstruction**. Massive dilation of colon without mechanical obstruction. Treat with **neostigmine** if no perforation.

91. **Carcinoid Syndrome:** From **liver metastases** of carcinoid tumor (usually ileal). **Flushing, diarrhea, bronchospasm, right-sided valvular heart disease**. Due to **serotonin (5-HT)**.
92. **Zollinger-Ellison Syndrome:** Gastrinoma (often in pancreas/duodenum). Causes refractory PUD, diarrhea. Part of **MEN 1**.
93. **Mesenteric Adenitis:** Mimics appendicitis. Often follows viral illness (e.g., Yersinia). Tender RLQ, but pain may be more diffuse.
94. **Splenic Rupture:** In **mononucleosis**, can occur with minor trauma. Avoid contact sports with splenomegaly.
95. **Gallstone Ileus:** Gallstone erodes into duodenum, causing SBO. **Rigler's Triad** on X-ray: pneumobilia, SBO, ectopic gallstone.
96. **Lymphoma "B" Symptoms: Fever, night sweats, weight loss >10%**.
97. **Pancoast Tumor:** Lung cancer in superior sulcus. Can cause **Horner's syndrome** (ptosis, miosis, anhidrosis) and **shoulder/arm pain**.
98. **Toxic Megacolon:** Life-threatening complication of **IBD (especially UC)**. Colon >6 cm, toxic appearance. Treat with IV steroids, may require **colectomy**.
99. **Gardner's Syndrome: FAP + osteomas + desmoid tumors + dental abnormalities**. Associated with **CHRPE**.
100. **Turcot's Syndrome: FAP + CNS tumors** (medulloblastoma, glioblastoma).

Gynecology & Obstetrics

Physiology & Prenatal Care

1. **Nägele's Rule:** Estimated Due Date (EDD) = Last Menstrual Period (LMP) + 1 year - 3 months + 7 days.
2. **Gravidity (G):** Total number of pregnancies. **Parity (P):** Number of pregnancies reaching **viability** (≥20 weeks), regardless of outcome. Often documented as GTPAL (Gravida, Term, Preterm, Abortions, Living).
3. **hCG (Human Chorionic Gonadotropin):** Produced by the **syncytiotrophoblast**. Doubles every 48 hours in early normal pregnancy. Peaks at 10 weeks.
4. **Physiologic Anemia of Pregnancy:** Due to **greater expansion of plasma volume** relative to red blood cell mass.
5. **Supine Hypotensive Syndrome:** Compression of the **IVC** by the gravid uterus when supine → hypotension. Relieved by **left lateral decubitus** position.
6. **Prenatal Screening:**

a. **1st Trimester:** Nuchal Translucency + PAPP-A, hCG (combined screen).
b. **2nd Trimester:** Quad Screen (AFP, hCG, Estriol, Inhibin A).
c. **Cell-Free Fetal DNA:** Highly accurate for aneuploidy screening after 10 weeks.

Maternal Complications in Pregnancy

7. **Hyperemesis Gravidarum:** Severe nausea/vomiting leading to weight loss >5%, dehydration, ketonuria. Risk factor: **High hCG levels** (e.g., molar pregnancy, multiples).
8. **Preeclampsia: New-onset hypertension (≥140/90) AND proteinuria (≥300 mg/24h)** after 20 weeks gestation. Can progress to **eclampsia** (seizures) or **HELLP syndrome**.
9. **HELLP Syndrome: H**emolysis, **E**levated **L**iver enzymes, **L**ow **P**latelets. A severe variant of preeclampsia.
10. **Definitive Treatment for Preeclampsia/Eclampsia/HELLP: Delivery of the fetus and placenta**.
11. **Acute Management of Eclamptic Seizure: IV Magnesium Sulfate** (first-line for seizure prophylaxis and treatment).
12. **Chronic Hypertension:** Hypertension present **before 20 weeks** or prior to pregnancy.
13. **Gestational Hypertension:** New hypertension after 20 weeks **without proteinuria**.
14. **Gestational Diabetes (GDM):** Screen with **1-hour 50g glucose challenge test** at 24-28 weeks. If positive, diagnose with **3-hour 100g oral glucose tolerance test**. Treated with diet, exercise, and if needed, **insulin** (first-line medication).
15. **Acute Fatty Liver of Pregnancy:** Rare but fatal. Presents in 3rd trimester with nausea/vomiting, abdominal pain, jaundice, and **hypoglycemia**. Diagnose with elevated AST/ALT, bilirubin, and **ammonia**.

Bleeding in Pregnancy

16. **First Trimester Bleeding:**
    a. **Ectopic Pregnancy:** #1 cause of maternal mortality in 1st trimester. Risk factors: PID, prior tubal surgery, IUD. Diagnose with **transvaginal ultrasound** and serial hCG. Treat with methotrexate or surgery.
    b. **Spontaneous Abortion (Miscarriage):** Types: threatened, inevitable, incomplete, complete, missed.
17. **Second/Third Trimester Bleeding:**

a. **Placenta Previa: Painless** bright red bleeding. **Absolute contraindication to vaginal exam**. Diagnose with ultrasound. Requires C-section.
b. **Placental Abruption: Painful** dark red bleeding, uterine tenderness, hypertonic uterus. Can cause **DIC**. Risk factors: **hypertension, trauma, cocaine use**.
c. **Vasa Previa:** Fetal vessels traversing the membranes over the internal os. Rupture of membranes causes **painless bleeding + fetal bradycardia**. Emergency C-section.

Infections in Pregnancy

18. **TORCH Infections: T**oxoplasma, **O**ther (Syphilis, VZV, Parvovirus B19), **R**ubella, **C**MV, **H**SV.
19. **Group B *Streptococcus* (GBS):** Screen at **35-37 weeks** with vaginal/rectal swab. Intrapartum **IV Penicillin G** is given to prevent neonatal sepsis.
20. **Chorioamnionitis:** Intra-amniotic infection. Triad: **Maternal fever, uterine tenderness, fetal tachycardia**. Treat with **broad-spectrum IV antibiotics** (e.g., Ampicillin + Gentamicin) and **delivery**.

Labor & Delivery

21. **Stages of Labor:**
    a. **1st Stage:** Onset of labor to full cervical dilation (10 cm). Has latent and active phases.
    b. **2nd Stage:** Full dilation to delivery of baby.
    c. **3rd Stage:** Delivery of baby to delivery of placenta.
22. **Abnormal Fetal Heart Rate (FHR) Patterns:**
    a. **Early Decelerations:** Head compression. **Mirror image** of contraction. Benign.
    b. **Variable Decelerations: Cord compression**. Abrupt, variable shape. Treat with position change, O2, amnioinfusion.
    c. **Late Decelerations: Uteroplacental insufficiency**. Onset after peak of contraction. Ominous sign.
23. **Bishop Score:** Predicts success of labor induction. Scores cervix on dilation, effacement, station, consistency, and position.
24. **Shoulder Dystocia:** Head delivers but shoulders are stuck. Maneuvers: **McRoberts** (hyperflex thighs to abdomen), suprapubic pressure, Wood's corkscrew. Complication: **Erb's Palsy**.

25. **Cesarean Section:** Most common reason for primary C-section is **failure to progress**. Classical incision (vertical on uterus) has higher risk of uterine rupture in subsequent pregnancies.

Postpartum & Fetal Complications

26. **Postpartum Hemorrhage (PPH):** >500 mL blood loss for vaginal, >1000 mL for C-section. **4 T's**: **T**one (uterine atony - #1 cause), **T**rauma (laceration), **T**issue (retained products), **T**hrombin (coagulopathy).
27. **Uterine Atony:** First-line treatment: **Bimanual uterine compression + IV Oxytocin**.
28. **Postpartum Endometritis:** Post-delivery fever, uterine tenderness, foul lochia. Treat with **IV Clindamycin + Gentamicin**.
29. **Sheehan's Syndrome:** Postpartum pituitary necrosis due to severe hypotension/hemorrhage → **panhypopituitarism**. Presents with failure to lactate (no prolactin).
30. **Fetal Lung Maturity:** Assessed by **Lecithin:Sphingomyelin (L:S) Ratio** on amniocentesis. **>2.0** indicates maturity. **Phosphatidylglycerol (PG)** is a later, definitive marker.

Gynecology: Menstrual Disorders

31. **Amenorrhea:**
    a. **Primary:** No menses by age 15 with normal development, or age 13 without development.
    b. **Secondary:** Absence of menses for >3 cycles or 6 months in a previously menstruating woman.
32. **Asherman's Syndrome: Secondary amenorrhea** from intrauterine adhesions/scarring, often after a D&C.
33. **Polycystic Ovarian Syndrome (PCOS): Rotterdam Criteria:** Need 2 of 3: 1) Oligo-/anovulation, 2) Clinical/biochemical signs of hyperandrogenism, 3) Polycystic ovaries on US. Associated with **insulin resistance**.
34. **Prolactinoma:** Causes galactorrhea and amenorrhea due to inhibition of GnRH. Treat with **dopamine agonists (Bromocriptine, Cabergoline)**.
35. **Dysfunctional Uterine Bleeding (DUB):** Diagnosis of exclusion for abnormal uterine bleeding without structural pathology. Most often due to **anovulation**.

Gynecology: Infections & Benign Conditions

36. **Pelvic Inflammatory Disease (PID):** Infection of the upper female genital tract. **Diagnostic Criteria:** Cervical motion tenderness, uterine/adnexal tenderness, fever. Often caused by *N. gonorrhoeae* or *C. trachomatis*. Treat with **IV/IM Ceftriaxone + oral Doxycycline +/- Metronidazole**.
37. **Bartholin Cyst/Abscess:** Obstruction of Bartholin's gland duct. Treat abscess with **Word Catheter** placement or marsupialization.
38. **Endometriosis:** Presence of endometrial tissue **outside the uterine cavity**. Presents with **dysmenorrhea, dyspareunia, infertility**. **Chocolate cysts** on ovaries. Diagnose via **laparoscopy**.
39. **Adenomyosis:** Endometrial tissue within the **myometrium**. Presents with **dysmenorrhea, menorrhagia, enlarged, boggy uterus**.
40. **Leiomyoma (Fibroids):** Benign smooth muscle tumors. Can cause menorrhagia, pelvic pressure. **Submucosal** fibroids most likely to cause bleeding.

Gynecology: Contraception

41. **Combined Oral Contraceptives (COCs):** Contain estrogen + progestin. **Contraindications:** History of thromboembolism, smokers >35, migraine with aura, breast cancer, uncontrolled hypertension.
42. **Progestin-Only Pills ("Mini-Pill"):** Thickens cervical mucus. Must be taken at the same time daily. Good for breastfeeding women.
43. **Intrauterine Device (IUD):**
    a. **Copper IUD:** Causes inflammatory reaction → spermicidal. Can cause heavier periods.
    b. **Levonorgestrel IUD:** Causes endometrial atrophy → lighter periods. Used for **menorrhagia**.
44. **Emergency Contraception:**
    a. **Levonorgestrel (Plan B):** Works by delaying ovulation. Less effective in obese women.
    b. **Ulipristal Acetate (Ella):** Progesterone receptor modulator. More effective than levonorgestrel.
    c. **Copper IUD:** Most effective method.

Oncology: Cervical

45. **Cervical Cancer Screening:**

    a. **Age 21-29:** Pap smear every 3 years.
    b. **Age 30-65:** Pap + HPV co-testing every 5 years (preferred) or Pap alone every 3 years.
46. **HPV:** Strains **16 and 18** cause 70% of cervical cancers. The **HPV vaccine** is prophylactic against high-risk strains.
47. **Cervical Intraepithelial Neoplasia (CIN):** Precancerous lesion. **CIN 1** often regresses. **CIN 2/3** requires excision (e.g., LEEP, cold knife cone).
48. **Microinvasive Cervical Cancer (Stage IA1):** Treated with **cone biopsy**. More advanced stages require **radical hysterectomy**.

Oncology: Ovarian

49. **Epithelial Ovarian Cancer:** Most common type. Presents late with abdominal distention, bloating, early satiety. **CA-125** is a tumor marker.
50. **Germ Cell Ovarian Tumors:** Often in **young women**. **Dysgerminoma** is the most common malignant type. Tumor marker: **LDH**.
51. **Risk Reduction for Ovarian Cancer: Oral contraceptive use** is protective. **BRCA1/2** mutations significantly increase risk; risk-reducing **bilateral salpingo-oophorectomy (BSO)** is recommended.
52. **Meigs' Syndrome:** Triad of **benign ovarian fibroma, ascites, and right-sided pleural effusion**. Resolves after tumor resection.

Oncology: Uterine & Other

53. **Endometrial Cancer:** Most common gynecologic malignancy. Presents with **postmenopausal bleeding**. Risk factors: **unopposed estrogen** (obesity, nulliparity, late menopause), Tamoxifen.
54. **Gestational Trophoblastic Disease (GTD):**
    a. **Complete Mole:** 46,XX (paternal only). No fetal tissue. "**Snowstorm**" appearance on US. High hCG.
    b. **Partial Mole:** 69,XXY. Fetal tissue may be present.
55. **Vulvar Cancer:** Most common type is **squamous cell carcinoma**. Often associated with **HPV**. Presents with pruritus, bleeding, mass.

Endocrinology & Infertility

56. **Infertility Workup:**
    a. **Female:** Ovulation (progesterone level), tubes (HSG), anatomy (US).

    b. **Male: Semen analysis** (first test).
57. **Clomiphene Citrate:** First-line ovulation induction drug. Selective Estrogen Receptor Modulator (SERM) → ↑ FSH.
58. **Assisted Reproductive Technology (ART): In Vitro Fertilization (IVF)**. Complication: **Ovarian Hyperstimulation Syndrome (OHSS)**.

Sexually Transmitted Infections (STIs)

59. **Chlamydia:** #1 reported bacterial STI. Can cause PID, Fitz-Hugh-Curtis syndrome (perihepatitis). Treat with **Doxycycline or Azithromycin**.
60. **Gonorrhea:** Can cause PID, disseminated infection (arthritis-dermatitis). Treat with **Ceftriaxone**.
61. **Syphilis:**
    a. **Primary:** Painless chancre.
    b. **Secondary:** Maculopapular rash (incl. palms/soles), condylomata lata.
    c. **Tertiary:** Gummas, neurosyphilis, aortitis.
    d. Treat with **Penicillin G**.
62. **Trichomoniasis:** Causes frothy, malodorous, greenish discharge. Motile trichomonads on wet mount. Treat with **Metronidazole** (treat partner too).
63. **Bacterial Vaginosis (BV): Clue cells** on wet mount, **fishy odor** (+whiff test), pH >4.5. Treat with **Metronidazole**.

Surgical & Procedural Facts

64. **Hysterectomy:** Surgical removal of the uterus.
    a. **Total:** Uterus + Cervix.
    b. **Radical:** Uterus, cervix, parametrium, upper vagina (for cancer).
65. **Oophorectomy:** Removal of ovary. **Salpingo-oophorectomy:** Removal of tube and ovary.
66. **Complication of Abdominal Hysterectomy: Ureteral injury** (at the level of the uterine artery - "water under the bridge").
67. **Dilation & Curation (D&C):** Used for diagnostic sampling or treatment of miscarriage. Risk: **Uterine perforation, Asherman's syndrome**.

Pharmacology in OB/GYN

68. **Teratogens:**
    a. **ACE inhibitors/ARBs:** Fetal renal damage, oligohydramnios.

    b. **Warfarin:** Fetal warfarin syndrome, chondrodysplasia punctata.
    c. **Lithium: Ebstein's anomaly** (tricuspid valve defect).
    d. **Isotretinoin (Vitamin A):** CNS, cardiac, craniofacial malformations.
    e. **Phenytoin:** Fetal hydantoin syndrome.
69. **Category X Drugs:** Absolutely contraindicated in pregnancy (e.g., Isotretinoin, Warfarin, Misoprostol, Methotrexate, Ribavirin).
70. **Medications in Labor:**
    a. **Oxytocin:** Induces labor. Risk: uterine hyperstimulation, water intoxication.
    b. **Misoprostol (PGE1):** Cervical ripening and labor induction. **Contraindicated in prior C-section** due to rupture risk.
    c. **Dinoprostone (PGE2):** Cervical ripening.
71. **Tocolytics:** Used to delay preterm labor.
    a. **Nifedipine (CCB):** First-line.
    b. **Indomethacin (NSAID):** Risk of premature closure of **ductus arteriosus** and oligohydramnios.
    c. **Terbutaline (Beta-agonist):** Can cause maternal pulmonary edema, tachycardia.

Miscellaneous High-Yield Facts

72. **Fibrocystic Breast Changes:** Benign. Presents with cyclical, painful, lumpy breasts. **No increased cancer risk**.
73. **Fibroadenoma:** Most common **benign breast tumor** in young women (<30). Mobile, firm, rubbery "**breast mouse**".
74. **Mastitis:** Breast infection, often during lactation. *S. aureus* is common cause. Treat with **Dicloxacillin**.
75. **Turner Syndrome (45,XO):** Presents with primary amenorrhea, short stature, webbed neck, coarctation of the aorta. **Streak ovaries**.
76. **Androgen Insensitivity Syndrome (46,XY):** Testes present (often intra-abdominal), female external genitalia, **absent uterus**, blind vaginal pouch. **Testosterone is high**.
77. **Müllerian Agenesis (Mayer-Rokitansky-Küster-Hauser Syndrome):** 46,XX. Normal female development but **absent uterus/vagina**. Ovaries are normal.
78. **Imperforate Hymen:** Presents at menarche with **primary amenorrhea, cyclical abdominal pain, and a bulging bluish membrane**. Treat with hymenectomy.
79. **Pelvic Organ Prolapse:** Descent of uterus (uterine prolapse), bladder (cystocele), or rectum (rectocele) into the vagina.
80. **Urinary Incontinence:**

    a. **Stress Incontinence:** Leakage with increased abdominal pressure (cough, laugh). Treat with Kegels, surgery.
    b. **Urge Incontinence:** Overactive bladder. Treat with anticholinergics (e.g., Oxybutynin).

81. **Menopause:** Diagnosis after **12 months of amenorrhea**. Due to ovarian follicle depletion → ↑ **FSH**. Presents with vasomotor symptoms (hot flashes), vaginal atrophy.
82. **Hormone Replacement Therapy (HRT):** Relieves menopausal symptoms. **Increased risk of VTE, stroke, breast cancer** with combined estrogen+progestin therapy.
83. **Osteoporosis Prevention: Calcium, Vitamin D, weight-bearing exercise**. **Bisphosphonates** are first-line treatment.
84. **Breast Cancer Risk Reduction: Tamoxifen** or **Raloxifene** (SERMs) for high-risk women.
85. **BRCA1/2 Mutations:** Increased risk of **breast and ovarian cancer**. Management includes increased screening and/or prophylactic mastectomy/BSO.
86. **Lichen Sclerosus:** White, atrophic plaques on vulva. **Increased risk of squamous cell carcinoma**.
87. **Vulvodynia:** Chronic vulvar pain without an identifiable cause.
88. **Premenstrual Dysphoric Disorder (PMDD):** Severe mood symptoms in the luteal phase. Treated with **SSRIs**.
89. **Female Sexual Dysfunction: Hypoactive sexual desire disorder** can be treated with **Flibanserin** or **Bremelanotide**.
90. **Ethical Principle in OB/GYN: Maternal autonomy is paramount**, even if it conflicts with fetal beneficence.
91. **Fetal Station:** Level of the presenting part relative to the ischial spines. 0 station = at the spines. +3 = at the introitus.
92. **Fetal Lie:** Relationship of the long axis of the fetus to the long axis of the mother (longitudinal, transverse, oblique).
93. **Fetal Presentation:** The part of the fetus that overlies the pelvic inlet (cephalic, breech, shoulder).
94. **Breech Presentation:** Types: Frank (hips flexed, knees extended), Complete (hips and knees flexed), Footling (feet first). **Contraindication to vaginal delivery**.
95. **External Cephalic Version (ECV):** Manual turning of a breech fetus to a vertex presentation. Done after 37 weeks.
96. **Multiple Gestations:**
    a. **Dizygotic (Fraternal):** Two eggs, two placentas (dichorionic/diamniotic).

    b. **Monozygotic (Identical):** One egg. Chorionicity/amnionicity depends on timing of split.
97. **Twin-Twin Transfusion Syndrome (TTTS):** Complication of **monochorionic** twins. Arteriovenous shunting in the placenta → donor twin (small, anemic, oligohydramnios) and recipient twin (large, polycythemic, polyhydramnios, heart failure).
98. **Fetal Macrosomia:** Birth weight >4000-4500g. Risk factors: **maternal diabetes, obesity, post-term pregnancy**. Risk of **shoulder dystocia**.
99. **Post-term Pregnancy:** >42 weeks gestation. Risks: **macrosomia, meconium aspiration, oligohydramnios**.
100. **Rho(D) Immune Globulin (RhoGAM):** Given to **Rh-negative** mothers at **28 weeks** and within **72 hours** of potential fetomaternal hemorrhage (e.g., delivery, abortion, amniocentesis) to prevent isoimmunization.

Anatomy

Upper Limb

1. **Brachial Plexus Lesions:**
    a. **Erb-Duchenne Palsy (Waiter's Tip):** C5-C6 injury. Arm adducted, internally rotated; wrist flexed. Mechanism: traction on head/shoulders (e.g., motorcycle crash, baby's head during delivery).
    b. **Klumpke Palsy (Claw Hand):** C8-T1 injury. Paralysis of intrinsic hand muscles, ulnar claw. Mechanism: grabbing something during a fall (e.g., tree branch).
2. **Wrist & Hand:**
    a. **Carpal Tunnel Syndrome:** Median nerve compression. Sensory loss over **lateral 3.5 fingers** (palmar side), thenar atrophy, weakness of thumb opposition/abduction.
    b. **Anatomical Snuffbox:** Borders: EPB & APL tendons (anterior), EPL tendon (posterior). Floor is **scaphoid**; tenderness here suggests scaphoid fracture.
    c. **Ulnar Nerve Injury:** "Claw hand" (loss of 3rd & 4th lumbricals), sensory loss over **medial 1.5 fingers**, inability to adduct/abduct fingers.
3. **Rotator Cuff Muscles (SITS): S**upraspinatus (initiates abduction), **I**nfraspinatus, **T**eres minor (both external rotation), **S**ubscapularis (internal rotation).

4. **Radial Nerve Injury:** "**Wrist Drop**". Injury in **spiral groove of humerus** (e.g., humeral shaft fracture) affects wrist and finger extensors. Sensory loss over dorsal hand.

Lower Limb

5. **Femoral Triangle (NAVeL):** From lateral to medial: **N**erve (Femoral), **A**rtery, **V**ein, empty space, **L**ymphatics.
6. **Femoral Hernia:** More common in **women**. Located **inferior to the inguinal ligament**, medial to the femoral vein. High risk of strangulation.
7. **Inguinal Hernia:** More common in **men**.
    a. **Direct:** Protrudes **medial** to inferior epigastric vessels, through **Hesselbach's triangle**. Acquired weakness.
    b. **Indirect:** Protrudes **lateral** to inferior epigastric vessels, through the **internal inguinal ring**. Due to a patent processus vaginalis.
8. **Ankle Injuries:**
    a. Inversion (most common) → damages **lateral ligaments** (Anterior Talofibular Ligament is first).
    b. Eversion → damages **deltoid ligament** (medial) or causes **Maisonneuve fracture** (proximal fibula).
9. **"Screw Home" Mechanism:** Knee extension involves **external rotation of the tibia** on the femur, locked by tension in the **ACL**.
10. **Tarsal Tunnel Syndrome:** Compression of the **tibial nerve** posterior to the medial malleolus. Causes pain/numbness in sole of foot.

Thorax

11. **Bronchopulmonary Segments:** The **superior segment of the lower lobe** is the most dependent segment in a supine patient → common site for **aspiration pneumonia**.
12. **Lung Cancer Locations:**
    a. **Squamous Cell & Small Cell:** Central (main bronchi).
    b. **Adenocarcinoma:** Peripheral.
    c. **Pancoast Tumor:** Apex of lung. Can cause **Horner's syndrome** (ptosis, miosis, anhidrosis) and **shoulder/arm pain** (brachial plexus invasion).
13. **Coronary Artery Dominance:** Determined by which artery gives off the **Posterior Descending Artery (PDA)**. **Right-dominant** is most common (~85%).
14. **Coronary Artery Supply:**

    a. **Left Anterior Descending (LAD):** "Widow-maker". Supplies **anterior wall, anterior septum, apex**.
    b. **Right Coronary Artery (RCA):** Supplies **SA node (60%), AV node (90%), inferior wall, posterior septum**.
15. **Pericardial Effusion/Tamponade: Beck's Triad:** Hypotension, JVD, muffled heart sounds. ECG may show **electrical alternans**.

Abdomen & Pelvis

16. **Foregut:** Supplied by the **Celiac Trunk**. Includes esophagus to 2nd part of duodenum, liver, pancreas, spleen.
17. **Midgut:** Supplied by the **Superior Mesenteric Artery (SMA)**. Includes 2nd part of duodenum to proximal 2/3 of transverse colon.
18. **Hindgut:** Supplied by the **Inferior Mesenteric Artery (IMA)**. Includes distal 1/3 of transverse colon to rectum.
19. **Marginal Artery of Drummond:** The major anastomosis between the SMA and IMA.
20. **Portal Hypertension:** Causes **caput medusae** (dilated paraumbilical veins), **esophageal varices** (drain via left gastric vein), **hemorrhoids** (drain via inferior rectal vein).
21. **McBurney's Point:** 2/3 the distance from the umbilicus to the ASIS. Tenderness suggests appendicitis.
22. **Inguinal Canal Boundaries:**
    a. **Deep Ring:** Midpoint of inguinal ligament.
    b. **Superficial Ring:** Just superior to pubic tubercle.
23. **Kidney Relations:** The **right kidney** is lower than the left due to the liver. The **left renal vein** passes **anterior** to the aorta and **posterior** to the SMA (risk of **SMA syndrome/Nutcracker syndrome**).

Head & Neck

24. **Cavernous Sinus Contents (O TOM CAT):**
    a. **O**culomotor (CN III), **T**rochlear (CN IV), **O**phthalmic (V1), **M**axillary (V2), **C**arotid artery, **A**bducens (CN VI), **T**horacic sympathetics.
    b. **CN VI (Abducens)** is most susceptible to injury because it floats freely within the sinus.
25. **Bell's Palsy:** Idiopathic **CN VII (Facial Nerve)** palsy. **Forehead is affected** (cannot wrinkle) because the lesion is peripheral. In a central stroke (UMN lesion), the forehead is spared due to bilateral innervation.

26. **Thyroidectomy Complications:**
    a. **Recurrent Laryngeal Nerve injury:** Hoarseness (unilateral), stridor (bilateral).
    b. **Superior Laryngeal Nerve injury:** Loss of high-pitched voice.
    c. **Parathyroid gland removal:** Hypocalcemia → tetany.
27. **Lymphatic Drainage:**
    a. **Virchow's Node (Troisier's Sign):** Left supraclavicular node. Drains thorax/abdomen. Enlargement suggests **GI malignancy** (e.g., stomach cancer).
28. **Parotid Gland: CN IX (Glossopharyngeal)** provides parasympathetic secretomotor fibers via the **otic ganglion**. The **facial nerve (CN VII)** runs through it; parotid surgery can cause facial palsy.

Neuroscience & Spine

29. **Internal Capsule:** A "V" shaped white matter tract. **Anterior limb:** Frontopontine tracts, thalamocortical. **Genu:** Corticobulbar tracts. **Posterior limb:** Corticospinal tracts, sensory (thalamocortical).
30. **Middle Cerebral Artery (MCA) Stroke: Contralateral** weakness/sensory loss of **face and arm > leg**. **Aphasia** (dominant hemisphere) or **neglect** (non-dominant hemisphere).
31. **Anterior Cerebral Artery (ACA) Stroke: Contralateral** weakness/sensory loss of **leg > arm**.
32. **Wernicke-Korsakoff Syndrome:** Due to **Thiamine (B1) deficiency**. **Wernicke's:** Confusion, ataxia, ophthalmoplegia. **Korsakoff's:** Confabulation, anterograde amnesia.
33. **Berry Aneurysm:** Most common site is the **Anterior Communicating Artery (ACom)**. Associated with **ADPKD** and **Ehlers-Danlos**.
34. **Brown-Séquard Syndrome:** Hemi-section of spinal cord.
    a. **Ipsilateral:** Loss of fine touch/vibration (dorsal columns), UMN weakness (corticospinal tract).
    b. **Contralateral:** Loss of pain/temp (spinothalamic tract).
35. **Horner's Syndrome: Ptosis, Miosis, Anhidrosis**. Due to interruption of the **sympathetic chain**. Can be caused by Pancoast tumor, carotid dissection.

Embryology

36. **Pharyngeal Arches:**

a. **Arch 1:** Mandible, muscles of mastication (CN V3).
b. **Arch 2:** Stapes, styloid process, muscles of facial expression (CN VII).
c. **Arch 3:** Stylopharyngeus muscle (CN IX).
d. **Arch 4 & 6:** Laryngeal cartilages, pharyngeal muscles (CN X).

37. **Aortic Arch Derivatives:**
    a. **Arch 3:** Common carotid arteries, proximal internal carotid.
    b. **Arch 4: Left** → aortic arch; **Right** → proximal right subclavian.
    c. **Arch 6: Left** → proximal left pulmonary artery & ductus arteriosus; **Right** → proximal right pulmonary artery.
38. **Thyroid Development:** Descends from the **foramen cecum** (base of tongue) to its final position. A **thyroglossal duct cyst** presents as a **midline neck mass that moves with swallowing and tongue protrusion**.

Miscellaneous High-Yield

39. **Diaphragm:** Innervated by **phrenic nerve (C3-C5)**. Openings:
    a. **Caval opening (T8):** IVC, right phrenic nerve.
    b. **Esophageal hiatus (T10):** Esophagus, vagal trunks.
    c. **Aortic hiatus (T12):** Aorta, thoracic duct, azygos vein.
40. **Spleen:** Located in the LUQ under ribs 9-11. A "notched" organ. Vulnerable to trauma in **mononucleosis**.
41. **Pancreas:** A retroperitoneal organ (except the tail). The **uncinate process** hooks posterior to the **SMA**.
42. **Ureteric Constrictions:** Three sites where kidney stones commonly lodge: 1) **Ureteropelvic Junction (UPJ)**, 2) **Pelvic Brim** (crosses iliac vessels), 3) **Ureterovesical Junction (UVJ)**.
43. **Testicular Drainage: Right testis** → drains to pre-aortic/L2 nodes. **Left testis** → drains to pre-aortic/L2 nodes. **Scrotum** → drains to superficial inguinal nodes.
44. **Ovarian & Testicular Arteries:** Branch directly off the **abdominal aorta**.
45. **Femoral Artery Access:** Enter below the **inguinal ligament**, midway between the **ASIS and pubic symphysis**.
46. **Cranial Nerve Foramina:**
    a. **CN I:** Cribriform plate.
    b. **CN II:** Optic canal.
    c. **CNs III, IV, V1, VI:** Superior orbital fissure.
    d. **CN V2:** Foramen rotundum.
    e. **CN V3:** Foramen ovale.
    f. **CN VII & VIII:** Internal acoustic meatus.

   g. **CNs IX, X, XI:** Jugular foramen.
   h. **CN XII:** Hypoglossal canal.

47. **Dermatomes:**
   a. **Nipple:** T4
   b. **Umbilicus:** T10
   c. **Inguinal ligament:** L1
48. **Muscle Stretch Reflexes:**
   a. Biceps (C5, C6)
   b. Brachioradialis (C5, C6)
   c. Triceps (C6, C7)
   d. Patellar (L2-L4)
   e. Achilles (S1, S2)
49. **Blood-Brain Barrier (BBB):** Formed by **tight junctions between capillary endothelial cells**, astrocyte foot processes, and a basement membrane. Lipid-soluble substances cross easily; water-soluble require specific transporters.
50. **Circle of Willis:** The major anastomosis at the base of the brain. Composed of the anterior communicating, anterior cerebral, internal carotid, posterior communicating, and posterior cerebral arteries. Provides collateral circulation.

Pharmacology

Autonomic Nervous System

1. **Cholinergic Toxicity (SLUDGE): S**alivation, **L**acrimation, **U**rination, **D**efecation, **GI** upset, **E**mesis. Caused by **organophosphates** and **muscarinic agonists**. Treat with **Atropine** (muscarinic antagonist) and **Pralidoxime** (regenerates AChE).
2. **Beta-1 Receptors:** Primarily in the **heart**. Stimulation → ↑ HR, ↑ contractility, ↑ conduction velocity.
3. **Beta-2 Receptors:** Primarily in **lungs, vasculature, uterus**. Stimulation → **bronchodilation**, vasodilation, uterine relaxation.
4. **Alpha-1 Receptors:** Located on **vascular smooth muscle**. Stimulation → **vasoconstriction**, increased BP, mydriasis (pupil dilation).
5. **Phenoxybenzamine: Irreversible, non-competitive alpha-blocker**. Used pre-op for **pheochromocytoma** to prevent hypertensive crisis. **Alpha-blockade must be established BEFORE beta-blockade**.
6. **Beta-Blocker Toxicity: B**radycardia, **B**ronchospasm, **B**P drop. Treat with **Glucagon** (bypasses blocked beta-receptors to increase cAMP).

Cardiovascular & Renal

7. **ACE Inhibitors (e.g., Lisinopril):** Cause **dry cough** and **angioedema** due to increased bradykinin. Other side effects: hyperkalemia, teratogenicity, **contraindicated in bilateral renal artery stenosis**.
8. **ARBs (e.g., Losartan):** Block angiotensin II receptor. Same effects as ACEi but **NO cough** (no effect on bradykinin).
9. **Dihydropyridine CCBs (e.g., Amlodipine, Nifedipine):** Act primarily on **vascular smooth muscle** → vasodilation, reflex tachycardia. Can cause **gingival hyperplasia** and peripheral edema.
10. **Non-Dihydropyridine CCBs (e.g., Verapamil, Diltiazem):** Act on **heart and vasculature**. Cause decreased HR and contractility. Used for rate control in AFib. **Avoid in heart failure**.
11. **Hydralazine:** Causes direct arteriolar vasodilation. Can cause **lupus-like syndrome** and **reflex tachycardia**. Used in heart failure with **isosorbide dinitrate** when ACE-i/ARB are contraindicated.
12. **Spironolactone/Eplerenone: Aldosterone antagonists**. K+-sparing diuretics. Side effects: **hyperkalemia**, gynecomastia (spironolactone). Used in CHF and ascites.
13. **Loop Diuretics (e.g., Furosemide):** Act on **Na+/K+/2Cl- cotransporter** in thick ascending limb. Cause **ototoxicity** and **hypokalemia**.
14. **Thiazide Diuretics (e.g., HCTZ):** Act on **early DCT**. Cause **hypercalcemia, hypokalemia, hyperglycemia, hyperlipidemia**.
15. **Digoxin:** Inhibits **Na+/K+ ATPase**. Used in HF and AFib. Toxicity causes: **N**ausea, **V**ision changes (yellow/green), **A**rrhythmias, **C**onfusion, **K↑** (hyperkalemia). **Treat toxicity with Digibind (antibody fragments)**.
16. **Amiodarone:** Class III antiarrhythmic. Side effects: **pulmonary fibrosis**, **thyroid dysfunction** (hyper/hypo), hepatotoxicity, corneal deposits, **blue-gray skin discoloration**, photosensitivity.

Antimicrobials

17. **Cell Wall Synthesis Inhibitors: Beta-lactams** (Penicillins, Cephalosporins, Carbapenems) and **Vancomycin**.
18. **Vancomycin:** Can cause **"Red Man Syndrome"** (histamine-mediated rash from rapid infusion) and **nephro/ototoxicity**.
19. **Aminoglycosides (e.g., Gentamicin):** Cause **nephrotoxicity** and **ototoxicity**. They are **concentration-dependent killers**.

20. **Macrolides (e.g., Azithromycin):** Inhibit protein synthesis. Can cause **QT prolongation** and **inhibit CYP450** (except azithromycin).
21. **Fluoroquinolones (e.g., Ciprofloxacin):** Cause **tendonitis/tendon rupture**, QT prolongation, cartilage damage in children.
22. **Tetracyclines:** Cause **discoloration of teeth** in children, photosensitivity, contraindicated in pregnancy/kids <8.
23. **Sulfa Drugs (e.g., TMP-SMX):** Can cause **Stevens-Johnson syndrome**, **hyperkalemia**, and **megaloblastic anemia**.
24. **Metronidazole:** Causes **disulfiram-like reaction** with alcohol. Treats anaerobes and *C. difficile*.
25. **Amphotericin B:** Broad-spectrum antifungal. "**Ampho-terrible**" - causes **nephrotoxicity**, hypokalemia, anemia. **Lipid formulations** reduce toxicity.

CNS Pharmacology

26. **Benzodiazepines (e.g., Diazepam):** Act on **GABA-A** receptors. Can cause respiratory depression. **Flumazenil** is the antidote.
27. **Barbiturates:** Also act on GABA-A but can **induce P450**. More dangerous overdose than benzos (no specific antidote).
28. **Opioid Overdose:** Triad: **coma, pinpoint pupils, respiratory depression**. Treat with **Naloxone**.
29. **Typical Antipsychotics (e.g., Haloperidol): D2 receptor antagonists**. Cause **extrapyramidal symptoms (EPS)**, hyperprolactinemia, neuroleptic malignant syndrome (NMS).
30. **Atypical Antipsychotics (e.g., Risperidone, Olanzapine):** Lower risk of EPS but can cause **metabolic syndrome** (weight gain, diabetes, dyslipidemia).
31. **TCAs (e.g., Amitriptyline):** Block reuptake of NE and 5-HT. Toxicity causes: **anticholinergic effects, QT prolongation, seizures**. Treat TCA overdose with **$NaHCO_3$**.
32. **SSRIs (e.g., Fluoxetine):** Can cause **sexual dysfunction**, insomnia, and **SIADH**. Risk of **serotonin syndrome** when combined with other serotonergic drugs.
33. **Serotonin Syndrome:** Triad: **Autonomic instability (fever, tachycardia), neuromuscular hyperactivity (clonus, hyperreflexia), mental status changes**. Treat with **Cyproheptadine**.
34. **Lithium:** Narrow therapeutic index. Toxicity causes: **tremor, polyuria/polydipsia (nephrogenic DI), hypothyroidism, teratogenicity (Ebstein's anomaly)**.
35. **Carbamazepine:** Induces CYP450, can cause **SIADH** and **aplastic anemia/agranulocytosis**.

36. **Phenytoin:** Zero-order kinetics, induces CYP450. Side effects: **gingival hyperplasia, megaloblastic anemia, hirsutism, teratogenicity (fetal hydantoin syndrome)**.

Endocrine & Chemotherapy

37. **Metformin:** First-line for Type 2 DM. Rare side effect: **lactic acidosis**. Contraindicated in renal failure, acidosis, hypoxia.
38. **Sulfonylureas (e.g., Glipizide):** Stimulate insulin release. Cause **hypoglycemia**. **Glucagon** is used for severe overdose.
39. **Thiazolidinediones (e.g., Pioglitazone):** PPAR-γ agonists. Side effects: **weight gain, edema, fractures, bladder cancer**.
40. **SGLT2 Inhibitors (e.g., Canagliflozin):** Cause glucosuria. Side effects: **genitourinary infections, euglycemic DKA**.
41. **Methotrexate:** Antifolate chemotherapeutic/immunosuppressant. Toxicity causes myelosuppression, mucositis. **Leucovorin rescue** is used.
42. **Bleomycin:** Causes **pulmonary fibrosis**. Risk factors: age, high dose, O2 therapy.
43. **Doxorubicin:** Causes **cardiomyopathy** (dose-dependent). Monitor with **echocardiogram**.
44. **Cyclophosphamide:** Causes **hemorrhagic cystitis**. Prevent with **Mesna**.
45. **Vinca Alkaloids (e.g., Vincristine):** Cause **peripheral neuropathy**.

Miscellaneous High-Yield

46. **Warfarin:** Inhibits synthesis of Vit K-dependent factors (II, VII, IX, X, Protein C & S). **PT/INR** monitors it. **Skin necrosis** can occur in protein C deficient patients. Many drug interactions.
47. **Heparin:** Activates **Antithrombin III**. Monitored with **PTT**. **Protamine sulfate** is the antidote.
48. **Heparin-Induced Thrombocytopenia (HIT): ↓ Platelets 5-10 days after starting heparin**. Paradoxically causes **thrombosis**. Treat by stopping heparin and using a direct thrombin inhibitor (e.g., argatroban).
49. **Statins (HMG-CoA Reductase Inhibitors):** Side effects: **myopathy/rhabdomyolysis, elevated LFTs**. **Contraindicated in pregnancy**.
50. **Allopurinol:** Inhibits xanthine oxidase. Used for gout. Can cause **severe rash (SJS/TEN)**, especially in renal impairment and when starting during an acute flare.

High-Yield ENT Facts

Ear

1. **Otitis Media (OM):** Most common in children. Often follows a URI. Pathogens: *S. pneumoniae*, *H. influenzae*, *M. catarrhalis*.
2. **Acute Otitis Media (AOM):** Presents with **otalgia**, fever, bulging, erythematous tympanic membrane. Treat with **Amoxicillin** (high dose).
3. **Otitis Media with Effusion (OME):** "Glue ear." **Fluid without signs of acute infection**. TM is dull, retracted, with air-fluid levels. Can cause conductive hearing loss.
4. **Otitis Externa ("Swimmer's Ear"):** Infection of the external auditory canal. Often *Pseudomonas aeruginosa*. Presents with **tragal tenderness**. Treat with topical antibiotic drops (e.g., Ciprodex).
5. **Malignant Otitis Externa:** In **diabetic or immunocompromised** patients. *Pseudomonas* osteomyelitis of the temporal bone. Treat with long-term IV anti-pseudomonal antibiotics.
6. **Conductive Hearing Loss:** Problem in external/middle ear (e.g., cerumen impaction, otitis media, otosclerosis). **Weber** lateralizes to affected ear; **Rinne** test is BC > AC (negative Rinne).
7. **Sensorineural Hearing Loss:** Problem in inner ear or CN VIII (e.g., presbycusis, noise-induced, acoustic neuroma). **Weber** lateralizes to the *unaffected* ear; **Rinne** test is AC > BC (positive Rinne).
8. **Presbycusis:** Age-related, bilateral high-frequency sensorineural hearing loss.
9. **Meniere's Disease:** Triad of **Vertigo, Tinnitus, Sensorineural Hearing Loss**. Caused by endolymphatic hydrops (increased fluid pressure in the inner ear). A fourth symptom is **aural fullness**.
10. **Benign Paroxysmal Positional Vertigo (BPPV):** Brief episodes of vertigo triggered by head movement (e.g., rolling over in bed). Due to **canaliths** (otoconia) in the semicircular canals (usually posterior). Treat with **Epley maneuver** (canalith repositioning).
11. **Vestibular Schwannoma (Acoustic Neuroma):** Benign tumor of **Schwann cells of CN VIII**. Presents with **unilateral, progressive sensorineural hearing loss** and tinnitus. Located at the **cerebellopontine angle**. Associated with **Neurofibromatosis Type 2**.
12. **Facial Nerve (CN VII) Palsy:**

a. **Bell's Palsy:** Idiopathic. **Forehead involvement** (cannot raise eyebrow). Treat with **corticosteroids** +/- antivirals.
b. **Ramsay Hunt Syndrome:** CN VII palsy + **vesicles in ear canal/pinna**. Caused by **VZV reactivation**.

13. **Cholesteatoma:** A **keratinizing squamous epithelium** in the middle ear. Can erode bones and cause conductive hearing loss. Presents with **chronic foul-smelling otorrhea**. Requires surgical excision.

Nose & Sinuses

14. **Allergic Rhinitis:** IgE-mediated. Presents with sneezing, rhinorrhea, nasal congestion, itchy eyes/nose. "**Allergic salute**," "**allergic shiners**."
15. **Epistaxis:**
    a. **Anterior bleed (90%):** From **Kiesselbach's plexus** (Little's area). Manage with direct pressure, cautery, or nasal packing.
    b. **Posterior bleed:** More severe. Often from **sphenopalatine artery**. Requires posterior nasal packing or embolization.
16. **Sinusitis:**
    a. **Acute Bacterial:** Often follows viral URI. Persistence of symptoms >10 days. Common pathogens similar to AOM. Treat with Amoxicillin-clavulanate.
    b. **Chronic:** Symptoms >12 weeks. Can be related to allergies, polyps, or dental issues.
17. **Complications of Sinusitis:** Orbital cellulitis, cavernous sinus thrombosis, meningitis, brain abscess.
18. **Nasal Polyps:** Associated with **chronic rhinosinusitis, asthma, and aspirin intolerance (Samter's Triad)**.

Throat & Oral Cavity

19. **Pharyngitis:**
    a. **Viral:** Most common. Rhinovirus, adenovirus, EBV.
    b. **Bacterial: Group A Strep (*S. pyogenes*)**. Treat with **Penicillin** to prevent rheumatic fever.
20. **Peritonsillar Abscess:** Complication of tonsillitis. "Hot potato" voice, uvular deviation, trismus. Treat with **drainage + antibiotics**.
21. **Epiglottitis:** Medical emergency! Caused by *H. influenzae type B* (now rare due to vaccination). Presents with high fever, drooling, dysphagia, **tripod positioning**, and **stridor**. **Do not examine the throat**—can cause laryngospasm. Secure airway first.

22. **Ludwig's Angina:** A rapidly spreading, bilateral cellulitis of the **submandibular and sublingual spaces**. Presents with a "brawny" indurated floor of mouth, tongue elevation, and potential airway compromise. Often from a dental infection. **Airway management is critical**.
23. **Laryngopharyngeal Reflux (LPR):** Atypical GERD. Presents with hoarseness, chronic cough, globus sensation, without classic heartburn.
24. **Hoarseness:**
    a. Acute: Laryngitis (viral), vocal strain.
    b. Chronic: LPR, vocal cord nodules/polyps, **laryngeal cancer**.
25. **Vocal Cord Nodules:** Bilateral, at the junction of the anterior and middle 1/3 of the vocal cords. From vocal abuse ("singer's nodes"). Treat with voice rest and therapy.
26. **Vocal Cord Polyps:** Usually unilateral, from acute vocal trauma. Can cause hoarseness.

Head & Neck Cancer

27. **Risk Factors for Head & Neck SCC: Tobacco** and **Alcohol** are the biggest. **HPV** (especially type 16) is a major cause of **oropharyngeal SCC** (tonsillar, base of tongue), which has a better prognosis.
28. **Leukoplakia: White patch** that cannot be scraped off. **Pre-malignant**.
29. **Erythroplakia: Red patch**. Has a **much higher risk of malignancy** than leukoplakia.
30. **Oral Cavity Cancer:** Most commonly on the **ventrolateral tongue** and floor of mouth.
31. **Laryngeal Cancer:** Presents with **persistent hoarseness**. Glottic cancers (on true vocal cords) present early with hoarseness. Supraglottic/subglottic present late.
32. **Nasopharyngeal Carcinoma:** Strongly associated with **EBV**. Presents with unilateral serous otitis media (from Eustachian tube blockage), cervical lymphadenopathy, epistaxis. More common in Asian populations.
33. **Thyroid Nodule:** Workup with **TSH** and **Ultrasound**. Suspicious features on US: microcalcifications, hypoechoic, irregular margins. **FNA biopsy** is the definitive diagnostic test.
34. **Thyroid Cancer Types:**
    a. **Papillary:** Most common. **Orphan Annie eyes, Psammoma bodies**. Excellent prognosis.
    b. **Medullary:** From parafollicular C-cells. Produces **calcitonin**. Associated with **MEN 2A/B**.

Salivary Glands & Neck Masses

35. **Sialadenitis:** Inflammation of salivary glands. Often due to obstruction (stone) or infection (e.g., *S. aureus*).
36. **Parotid Gland Tumor: 80% are benign**. The most common benign tumor is **Pleomorphic Adenoma**. The most common malignant tumor is **Mucoepidermoid Carcinoma**.
37. **Warthin's Tumor:** Benign, almost exclusively in the **parotid tail**. Bilateral in 10% of cases. Associated with **smoking**.
38. **Branchial Cleft Cyst:** Most common is **Type II**, presenting as a **lateral neck mass anterior to the sternocleidomastoid muscle**. Can become infected.
39. **Thyroglossal Duct Cyst: Midline neck mass** that **elevates with tongue protrusion**. Treat with **Sistrunk procedure** (removal of cyst + central portion of hyoid bone).
40. **Lymphatic Malformation (Cystic Hygroma):** A congenital malformation of the lymphatic system. Presents as a soft, compressible, transilluminable mass in the neck of an infant. Often diagnosed in utero.

Pediatric ENT

41. **Croup (Laryngotracheobronchitis):** Viral (Parainfluenza). Presents with **barking cough, inspiratory stridor, hoarseness**. "**Steeple sign**" on neck X-ray. Treat with **dexamethasone** and nebulized epinephrine for severe cases.
42. **Foreign Body Aspiration:**
    a. **Larynx/Trachea:** Sudden onset stridor, dyspnea.
    b. **Bronchi:** Unilateral wheezing. Common in toddlers. **Right mainstem bronchus** is most common site.
    c. **Esophagus:** Dysphagia, drooling. Can cause airway compression if in upper esophagus.
43. **Obstructive Sleep Apnea (OSA) in Children:** Often due to **adenotonsillar hypertrophy**. Presents with snoring, mouth breathing, daytime sleepiness, and sometimes behavioral issues. First-line treatment is **adenotonsillectomy**.

Trauma & Emergencies

44. **CSF Rhinorrhea:** Clear, watery nasal drainage after head trauma. Due to a fracture of the **cribriform plate** (disrupting the roof of the ethmoid sinus). Test for **halo sign** or beta-2 transferrin.

45. **Basilar Skull Fracture Signs:**
    a. **Battle's Sign:** Mastoid ecchymosis.
    b. **Raccoon Eyes:** Periorbital ecchymosis.
    c. CSF otorrhea/rhinorrhea, hemotympanum.
46. **Blowout Fracture:** Fracture of the orbital floor from a direct blow to the eye. Presents with **diplopia on upward gaze** (entrapment of inferior rectus), enophthalmos, infraorbital numbness.

Anatomy & Pharmacology

47. **Facial Nerve Branches (mnemonic):** "**T**en **Z**ebras **B**it **M**y **C**ock" - **T**emporal, **Z**ygomatic, **B**uccal, **M**andibular, **C**ervical.
48. **Innervation of the Tongue:**
    a. **Sensation:** Anterior 2/3 - **CN V3**, Posterior 1/3 - **CN IX**.
    b. **Taste:** Anterior 2/3 - **Chorda Tympani (CN VII)**, Posterior 1/3 - **CN IX**.
    c. **Motor: CN XII**.
49. **Ototoxic Drugs: Aminoglycosides** (Gentamicin), **Loop Diuretics** (Furosemide), **Chemotherapy** (Cisplatin), high-dose Aspirin.
50. **First-Line Antibiotics in ENT:**
    a. **Strep Pharyngitis:** Penicillin VK.
    b. **AOM/Sinusitis:** Amoxicillin (high-dose) or Amoxicillin-Clavulanate.
    c. **Otitis Externa:** Topical Fluoroquinolones (Ciprofloxacin) +/- steroids.

Ophthalmology

Red Eye & Conjunctiva

1. **Conjunctivitis:**
    a. **Bacterial:** Purulent discharge, "sticky eye." Common in kids. *S. aureus*, *S. pneumoniae*, *H. influenzae*.
    b. **Viral:** Watery discharge, often with pre-auricular lymphadenopathy. Highly contagious.
    c. **Allergic: Itching** is the hallmark. Chemosis (conjunctival swelling), seasonal.
2. **Subconjunctival Hemorrhage:** Bright red, painless patch. Benign, resolves spontaneously. Can be traumatic or from Valsalva.

3. **Keratitis:** Corneal inflammation. Causes include infection (bacterial, viral like HSV), contact lens overwear (*Pseudomonas* risk). Presents with pain, photophobia, foreign body sensation.
4. **Corneal Abrasion:** Defect in corneal epithelium. Diagnosed with **fluorescein staining** and a cobalt blue light. Treat with antibiotic drops and consider cycloplegics for pain.

Painful Red Eye & Glaucoma

5. **Acute Angle-Closure Glaucoma: Ophthalmologic emergency.** Presents with sudden, severe eye pain, **fixed mid-dilated pupil**, headache, nausea/vomiting, and **cloudy ("steamy") cornea**. Caused by obstructed aqueous outflow → **elevated intraocular pressure**. Treat urgently with **acetazolamide, topical beta-blockers, and pilocarpine** to constrict the pupil, followed by laser iridotomy.
6. **Uveitis (Iritis):** Inflammation of the iris/ciliary body. Presents with **pain, photophobia, perilimbal injection (ciliary flush)**, and **miosis**. Associated with **HLA-B27** conditions (Ankylosing Spondylitis, IBD, Reactive Arthritis).
7. **Scleritis:** Deep, boring pain that may radiate. Can be associated with **rheumatoid arthritis**, granulomatosis with polyangiitis. **Episcleritis** is more superficial and benign.

Neuro-ophthalmology

8. **Cranial Nerve Palsies:**
    a. **CN III (Oculomotor):** "Down and Out" eye, **ptosis**, **dilated pupil**. **Surgical** (compressive) vs. **Medical** (microvascular, e.g., diabetes) - medical spares the pupil.
    b. **CN IV (Trochlear):** Causes vertical diplopia, worse on looking down and in (e.g., going down stairs). Head tilt *away* from the affected side.
    c. **CN VI (Abducens):** Inability to abduct the eye → **medial deviation**. Causes: increased ICP, microvascular disease.
9. **Horner's Syndrome: Ptosis, Miosis, Anhidrosis**. Due to interruption of the **sympathetic chain**. Causes: Pancoast tumor, carotid dissection, lateral medullary stroke.
10. **Marcus Gunn Pupil (Relative Afferent Pupillary Defect - RAPD):** Swinging flashlight test shows **paradoxical dilation** when light is swung to the affected eye. Indicates optic nerve damage (e.g., optic neuritis, severe glaucoma). The **affected eye is the one that dilates when light is shone in it**.

11. **Argyll Robertson Pupils:** "Prostitute's Pupils" - **Accommodate but don't react** (light-near dissociation). Associated with **neurosyphilis**.
12. **Internuclear Ophthalmoplegia (INO):** Lesion in the **Medial Longitudinal Fasciculus (MLF)**. On lateral gaze: **impaired adduction** of the ipsilateral eye and **nystagmus** of the abducting contralateral eye. Classic for **Multiple Sclerosis**.
13. **Visual Field Defects:**
    a. **Bitemporal Hemianopia:** Lesion at the **Optic Chiasm** (e.g., pituitary adenoma).
    b. **Homonymous Hemianopia:** Lesion **post-chiasmal** in the optic tract, radiation, or occipital cortex. "Pie in the sky" → temporal lobe (Meyer's loop); "Pie on the floor" → parietal lobe.
    c. **Central Scotoma: Optic Neuritis** (e.g., MS), macular degeneration.

Retina & Vitreous

14. **Diabetic Retinopathy:**
    a. **Non-Proliferative (NPDR):** Microaneurysms, dot/blot hemorrhages, hard exudates.
    b. **Proliferative (PDR): Neovascularization**. High risk for vitreous hemorrhage and tractional retinal detachment.
    c. **Macular Edema:** Can occur at any stage; major cause of vision loss.
15. **Hypertensive Retinopathy: AV nicking**, copper/silver wiring, cotton-wool spots, flame hemorrhages. **Keith-Wagener-Barker Classification**.
16. **Retinal Detachment:** Presents with **floaters, photopsia (flashes of light), and a "curtain or shade"** coming over the visual field. **Surgical emergency**.
17. **Age-Related Macular Degeneration (AMD):**
    a. **Dry (atrophic):** More common (90%). Drusen deposits. Slow, progressive central vision loss.
    b. **Wet (neovascular/exudative):** Less common (10%), more severe. **Choroidal neovascularization** → sudden central vision loss, distortion (metamorphopsia). Treat with **anti-VEGF injections**.
18. **Central Retinal Artery Occlusion (CRAO): Painless, sudden monocular vision loss**. Fundus shows **cherry-red spot** with pale retina. Embolic (e.g., carotid plaque) is most common cause. **Medical emergency** (therapeutic window ~90 mins).
19. **Central Retinal Vein Occlusion (CRVO):** "**Blood and thunder**" fundus. Presents with sudden, painless vision loss. Can cause neovascular glaucoma.

20. **Retinoblastoma:** Most common primary intraocular malignancy of childhood. Presents with **leukocoria (white pupillary reflex)**. **Knudson's "two-hit" hypothesis**. Associated with **13q14 deletion (RB1 gene)**.

Lens & Cataracts

21. **Cataract:** Opacification of the lens. Causes: aging (most common), trauma, steroids, diabetes, galactosemia (in infants). Presents with progressive, painless vision loss, glare.
22. **Subluxed Lens (Ectopia Lentis):** Upward lens dislocation classically seen in **Marfan syndrome**. Downward dislocation is seen in **Homocystinuria**.

Eyelids & Orbit

23. **Chalazion:** Obstructed **meibomian gland**. Painless nodule on the inner eyelid. Treat with warm compresses.
24. **Hordeolum (Stye):** Infection of eyelash follicle (external) or meibomian gland (internal). Painful, erythematous nodule. Often *S. aureus*. Treat with warm compresses.
25. **Blepharitis:** Chronic inflammation of the eyelid margins. Causes redness, crusting, and gritty sensation.
26. **Orbital Cellulitis vs. Preseptal Cellulitis:**
    a. **Preseptal:** Anterior to orbital septum. Eyelid is swollen, red, but **vision and extraocular movements are normal**.
    b. **Orbital:** Posterior to septum. **Ophthalmologic emergency.** Presents with proptosis, pain with eye movement, **impaired EOMs**, decreased vision, and fever. Often from sinusitis extension.
27. **Graves' Ophthalmopathy:** Proptosis, lid retraction, lid lag, restrictive myopathy (often inferior rectus). Caused by lymphocytic infiltration and glycosaminoglycan deposition.

Trauma

28. **Blowout Fracture:** Fracture of the orbital floor. Presents with **diplopia on upward gaze** (inferior rectus entrapment), enophthalmos, infraorbital numbness (CN V2).
29. **Corneal Foreign Body:** Diagnose with fluorescein stain. Must evert the eyelid to check for a subtarsal foreign body.

30. **Chemical Burn: Irrigate immediately** with normal saline for at least 30 minutes. **Alkali burns** (e.g., lye, ammonia) are worse than acid burns as they penetrate deeper.

Pharmacology

31. **Mydriatics (Dilators): Anticholinergics** (e.g., Tropicamide, Cyclopentolate, **Atropine**). Contraindicated in **angle-closure glaucoma**.
32. **Miotics (Constrictors): Cholinergics** (e.g., Pilocarpine). Used in glaucoma.
33. **Topical Beta-Blockers (e.g., Timolol):** For glaucoma. Can cause systemic effects: bronchospasm, bradycardia.
34. **Prostaglandin Analogs (e.g., Latanoprost):** First-line for open-angle glaucoma. Side effect: **changes iris color (increased brown pigmentation), eyelash growth**.
35. **Acetazolamide:** Carbonic anhydrase inhibitor used for glaucoma. Side effects: metabolic acidosis, paresthesias, hypokalemia, sulfa allergy.

Pediatric Ophthalmology

36. **Amblyopia ("Lazy Eye"):** Decreased vision in an otherwise structurally normal eye due to inadequate visual stimulation during the **critical period** (<7-9 years). Causes: strabismus, refractive error, deprivation (e.g., cataract).
37. **Strabismus:**
    a. **Esotropia:** Eye turns in.
    b. **Exotropia:** Eye turns out.
    c. Can cause amblyopia if not corrected.
38. **Congenital Nasolacrimal Duct Obstruction:** Presents with chronic **tearing (epiphora) and mattering** in an infant without conjunctival injection. Most resolve spontaneously by 1 year.
39. **Retinopathy of Prematurity (ROP):** Abnormal vascular proliferation in premature infants, especially those with low birth weight and high oxygen exposure. Can lead to retinal detachment and blindness. Screen infants <1500g or <30 weeks.

Infections & Systemic Associations

40. **CMV Retinitis:** Seen in **AIDS** patients (CD4 <50). "**Pizza pie**" or "ketchup and cottage cheese" retina. Can cause retinal detachment.

41. **Ocular Toxoplasmosis:** Most common cause of posterior uveitis. Reactivation of congenital infection. "**Headlight in the fog**" - focal retinochoroiditis adjacent to an old pigmented scar.
42. **Ocular Manifestations of Sarcoidosis:** Uveitis, lacrimal gland enlargement, conjunctival nodules.
43. **Cataracts in Galactosemia:** "Oil droplet" cataract. Due to accumulation of galactitol.

Miscellaneous High-Yield

44. **Papilledema:** Bilateral optic disc swelling from **increased intracranial pressure**. Presents with **transient visual obscurations**, headache, and enlargement of the blind spot.
45. **Optic Neuritis:** Inflammation of the optic nerve. Presents with **monocular vision loss**, pain with eye movement, and **RAPD**. Strongly associated with **Multiple Sclerosis**.
46. **Anterior Ischemic Optic Neuropathy (AION):** "Morning stroke" - painless vision loss upon waking. **Non-arteritic** (more common, associated with hypertension/diabetes) vs. **Arteritic** (Giant Cell Arteritis - requires immediate steroids).
47. **Vitamin A Deficiency:** Causes **night blindness** and **Bitot's spots** (foamy patches on conjunctiva).
48. **Xanthelasma:** Yellowish cholesterol deposits on eyelids. Associated with hyperlipidemia.
49. **Pinguecula & Pterygium:** Benign growths on the conjunctiva from UV exposure. Pterygium is a wing-shaped growth that can encroach on the cornea.
50. **Herpes Zoster Ophthalmicus:** VZV reactivation in **CN V1**. **Hutchinson's sign** (vesicles on the tip of the nose) indicates **nasociliary nerve involvement** and high risk of **ocular involvement** (keratitis, uveitis).

Forensic Medicine

Death & Injury Interpretation

1. **Rigor Mortis:** Stiffening of muscles after death due to ATP depletion. Begins **2-4 hours** post-mortem, peaks at **12 hours**, and resolves after **24-48 hours**.

2. **Livor Mortis (Lividity):** Settling of blood due to gravity, causing purple discoloration of dependent body parts. Begins **30 min - 2 hours** after death and becomes **fixed after 8-12 hours**. If the pattern doesn't match the body's position, the body was moved after death.
3. **Algor Mortis:** The cooling of the body after death. Rough guideline: body cools at **~1.5°F (0.8°C) per hour**. This is highly variable and not a reliable lone indicator of time of death.
4. **Causes of Asphyxia:**
    a. **Hanging:** Typically causes **ligature mark above the thyroid cartilage**. Judicial hangings cause C2 fracture ("hangman's fracture").
    b. **Drowning:** "**Washerwoman's hands and feet**" (wrinkled, waterlogged skin). **Paltauf's spots** (pleural petechiae) may be present.
5. **Carbon Monoxide (CO) Poisoning:** Causes **cherry-red** lividity. Binds to hemoglobin with **>200x affinity** than oxygen, forming **carboxyhemoglobin**.
6. **Cyanide Poisoning:** Causes **bitter almond odor**. Inhibits cytochrome c oxidase (complex IV) → histotoxic hypoxia. Can cause **bright red** lividity due to high venous oxygen.
7. **Café Coronary:** Sudden death from **food aspiration/airway obstruction**, often in an intoxicated or elderly individual. Mimics a heart attack.
8. **"Railroad Track" Contusion:** A pattern injury caused by being struck by a **pipe or rod**, leaving two parallel lines of bruising.
9. **Defense Wounds:** Cuts on the **palms, forearms, or ulnar aspect of the hands**, sustained while trying to fend off an attacker.

Forensic Toxicology

10. **Methanol Poisoning:** Causes **visual disturbances (snowfield vision), optic disc hyperemia**. Metabolized to **formic acid**, causing a **high anion gap metabolic acidosis**. Treat with **fomepizole or ethanol** and **folinic acid**.
11. **Ethylene Glycol Poisoning:** Presents with **drunkenness without alcohol on breath**, **calcium oxalate crystals in urine**, and **high anion gap metabolic acidosis**. Treat with **fomepizole or ethanol** and **thiamine/pyridoxine**.
12. **Opioid Overdose:** Triad: **coma, pinpoint pupils, respiratory depression**. Treat with **naloxone**.
13. **Organophosphate/Carbamate Poisoning:** Causes **cholinergic excess (SLUDGE: Salivation, Lacrimation, Urination, Defecation, GI upset, Emesis)**. Also: muscle fasciculations, bronchospasm, bradycardia. Treat with **atropine** and **pralidoxime (2-PAM)**.

14. **Salicylate (Aspirin) Toxicity:** Causes **tinnitus, tachypnea, hyperthermia, mixed respiratory alkalosis & high anion gap metabolic acidosis**. Treat with **sodium bicarbonate** to alkalinize urine and enhance renal excretion.
15. **Acetaminophen Toxicity:** 4 stages: 1) Nausea/Vomiting, 2) Apparent improvement, 3) Hepatic necrosis (↑AST/ALT), 4) Recovery or death. Treat with **N-acetylcysteine (NAC)** based on the **Rumack-Matthew nomogram**.

Child & Elder Abuse

16. **Shaken Baby Syndrome:** Triad: **Encephalopathy, Subdural Hemorrhage, Retinal Hemorrhages**. Often no external signs of trauma.
17. **Caffey Disease (Infantile Cortical Hyperostosis):** A benign, self-limiting condition that can mimic child abuse due to multiple bone lesions. Differentiated by its specific presentation and resolution.
18. **Battered Child Syndrome:** A child presenting with multiple fractures in various stages of healing, bruises, burns, or other injuries inconsistent with the provided history.
19. **Elder Abuse:** Look for signs like unexplained bruises, fractures, burns, poor hygiene, malnutrition, and withdrawal. **Mandatory reporting** is required in most states.

Legal & Ethical Principles

20. **Informed Consent:** Requires disclosure of the **nature of the procedure, risks, benefits, and alternatives**. The patient must be **competent** (have decision-making capacity) and the consent must be **voluntary**.
21. **Implied Consent:** Applies in **emergencies** when a patient is unconscious or incapacitated and immediate treatment is needed to prevent death or disability.
22. **Testimonial Competence:** A physician can opine on a witness's ability to testify based on their understanding of the duty to tell the truth.
23. **Tarasoff Duty/Duty to Warn:** A physician has a **duty to breach confidentiality** to warn a specific, identifiable victim of a serious threat made by a patient.
24. **Competence vs. Capacity:**
    a. **Competence:** A **legal determination** made by a judge.
    b. **Capacity:** A **clinical determination** made by a physician regarding a patient's ability to understand a specific decision at a specific time.
25. **Brain Death Criteria:** Irreversible cessation of all brain function, including the brainstem. Must have a known cause, no confounding factors (e.g., hypothermia,

drugs), and absent brainstem reflexes (e.g., no gag, no corneal reflex, no respiratory drive on apnea test).

Sexual Assault & Evidence

26. **"Rape Kit" (Sexual Assault Evidence Kit):** Used to collect forensic evidence, including swabs for DNA, fingernail scrapings, and foreign materials. Must obtain **patient consent**.
27. **Chain of Custody:** The documented, unbroken sequence of possession for all evidence. Critical for evidence to be admissible in court.

Miscellaneous High-Yield

28. **Excited Delirium:** A controversial syndrome often associated with cocaine/amphetamine use, extreme agitation, hyperthermia, and sudden death, often during or after physical restraint by law enforcement.
29. **Munchausen Syndrome:** When a person **fakes or induces illness in themselves** to assume the sick role.
30. **Munchausen Syndrome by Proxy (Factitious Disorder Imposed on Another):** A form of child abuse where a **caregiver (typically the mother) fabricates or induces illness in a child** to gain medical attention.

Community Medicine

Epidemiology & Biostatistics

1. **Incidence vs. Prevalence:**
    a. **Incidence:** Number of **new** cases in a population during a time period. Measures **risk**.
    b. **Prevalence:** Total number of **existing** cases (new + old) in a population at a specific time. Measures **disease burden**. **Prevalence ≈ Incidence × Duration**.
2. **Sensitivity & Specificity:**
    a. **Sensitivity:** Ability to correctly identify those **WITH** the disease (True Positive rate). **High Sensitivity** rules **OUT** disease (**SnOUT**). Ideal for screening tests.

    b. **Specificity:** Ability to correctly identify those **WITHOUT** the disease (True Negative rate). **High Specificity** rules **IN** disease (**SpIN**). Ideal for confirmatory tests.
3. **Positive & Negative Predictive Value (PPV/NPV):** Depend on the **prevalence** of the disease in the population. Higher prevalence increases PPV and decreases NPV.
4. **Types of Studies:**
    a. **Randomized Controlled Trial (RCT):** Gold standard for **therapy**. Randomized, controlled, prospective.
    b. **Cohort Study:** Follows a group **from exposure to outcome**. Can calculate **Relative Risk (RR)**. Good for studying **rare exposures**.
    c. **Case-Control Study:** Starts with people with and without the disease and looks back for exposures. Can calculate **Odds Ratio (OR)**. Good for studying **rare diseases**.
    d. **Cross-Sectional Study:** Provides a "snapshot" of exposure and outcome at a single time. Can measure **prevalence**.
5. **Relative Risk (RR):** Risk in exposed / Risk in unexposed (from cohort studies). **RR=1** means no association.
6. **Odds Ratio (OR):** Odds of exposure in cases / Odds of exposure in controls (from case-control studies). **OR approximates RR when the disease is rare**.
7. **Absolute Risk Reduction (ARR):** Risk in control group - Risk in treatment group.
8. **Number Needed to Treat (NNT):** 1 / ARR. The number of patients you need to treat to prevent one bad outcome. **Lower NNT is better**.
9. **Number Needed to Harm (NNH):** 1 / Absolute Risk Increase. The number of patients needed to be exposed to a risk factor to cause harm in one patient.
10. **Bias Types:**
    a. **Selection Bias:** Systematic error in how participants are selected.
    b. **Recall Bias:** Cases and controls recall exposure differently (common in case-control studies).
    c. **Lead-Time Bias:** Screening detects disease earlier, *artificially* increasing survival time without affecting actual outcome.

Preventive Medicine & Screening

11. **Lead Time:** The time between early detection via screening and when the diagnosis would have been made due to symptoms.
12. **Screening Recommendations (U.S. Preventive Services - USPSTF):**
    a. **Breast Cancer:** Mammography every 2 years for women **50-74**.

b. **Cervical Cancer:** Pap smear every 3 years (21-29) or Pap + HPV co-testing every 5 years (30-65).
c. **Colorectal Cancer:** Screening from age **45** to 75 (colonoscopy, FIT, etc.).
d. **Lung Cancer:** Annual low-dose CT for adults **50-80** with a **20 pack-year** history who **currently smoke or quit within the past 15 years**.
e. **Abdominal Aortic Aneurysm:** One-time ultrasound for men **65-75** who have **ever smoked**.

13. **Vaccine Schedule (Key Adult/Adolescent):**
    a. **Tdap:** Once as an adult, then **Td booster every 10 years**.
    b. **HPV Vaccine:** Recommended for all adolescents at age **11-12** (can start at 9).
    c. **Shingles (RZV - Shingrix):** For adults **≥50**.
    d. Pneumococcal:
        i. **PCV20** OR **PCV15 followed by PPSV23** for all adults **≥65** and those with high-risk conditions.
14. **Primary vs. Secondary vs. Tertiary Prevention:**
    a. **Primary:** Preventing disease before it occurs (e.g., **vaccinations**, smoking cessation).
    b. **Secondary:** Early detection to halt progression (e.g., **screening** mammography).
    c. **Tertiary:** Reducing complications of an established disease (e.g., **metformin for diabetes** to prevent complications).

Health Policy & Ethics

15. **Reportable Diseases:** Physicians must report certain diseases to public health authorities (e.g., **TB, HIV, Hepatitis, Gonorrhea, Syphilis, Measles, Pertussis, Foodborne illnesses**).
16. **STARR Criteria for Screening:** A disease should be **S**erious, with a **T**reatable or **A**ctionable early stage, with a **R**eliable and **R**easonable screening test.
17. **Informed Consent Elements:** The patient must be informed of the **nature of the procedure, risks, benefits, and alternatives**. Must be **competent** and the consent must be **voluntary**.
18. **Emancipated Minor:** A minor who can consent to their own medical care. Criteria vary by state but generally include: being married, in the military, financially independent, or a parent.
19. **Health Insurance Portability and Accountability Act (HIPAA):** Protects the privacy and security of patient health information.

Infectious Disease & Environmental Health

20. **Outbreak Definitions:**
    a. **Endemic:** The usual, baseline level of disease in a geographic area.
    b. **Epidemic:** A sudden increase in cases **above the expected endemic level**.
    c. **Pandemic:** An epidemic that has spread over multiple **countries or continents**.
21. **Modes of Transmission:**
    a. **Direct:** Person-to-person (touch, droplets).
    b. **Indirect:** Via a vector (mosquito) or vehicle (food, water, air).
22. **Herd Immunity:** The protection of unvaccinated individuals when a significant portion of the population is immune, breaking chains of transmission.
23. **Common Source vs. Propagated Outbreak:**
    a. **Common Source:** Everyone is exposed to a single source (e.g., contaminated food at a picnic). Epidemic curve rises and falls rapidly.
    b. **Propagated:** Transmission from person-to-person (e.g., influenza). Epidemic curve shows progressively taller peaks.
24. **Fetal Alcohol Spectrum Disorders:** The **most common preventable cause of intellectual disability**. There is **no known safe amount** of alcohol during pregnancy.

Nutrition & Miscellaneous

25. **Leading Causes of Death in US Adults:** 1) Heart Disease, 2) Cancer, 3) COVID-19, 4) Unintentional Injury (including overdose).
26. **Obesity Classifications (BMI):**
    a. **Normal:** 18.5 - 24.9
    b. **Overweight:** 25 - 29.9
    c. **Obese Class I:** 30 - 34.9
    d. **Obese Class II:** 35 - 39.9
    e. **Obese Class III (Morbid):** ≥40
27. **Vitamin Deficiencies:**
    a. **B1 (Thiamine):** Beriberi (wet/dry), Wernicke-Korsakoff syndrome (in alcoholics).
    b. **B3 (Niacin):** Pellagra (**D**ementia, **D**ermatitis, **D**iarrhea).
    c. **B12:** Megaloblastic anemia, neurologic symptoms (e.g., subacute combined degeneration).
    d. **Vitamin C:** Scurvy (bleeding gums, poor wound healing).

    e. **Vitamin D:** Rickets (children), Osteomalacia (adults).
28. **Tanner Staging:** Standardized system to track the stages of pubertal development.
29. **Kubler-Ross Stages of Grief: D**enial, **A**nger, **B**argaining, **D**epression, **A**cceptance. (Not always linear).
30. **Social Determinants of Health:** Conditions in the environments where people are born, live, learn, work, and age that affect health outcomes (e.g., **income, education, access to healthy food, exposure to violence**).

General Pathology

Cellular Injury & Adaptation

1. **Ischemia-Reperfusion Injury:** Cellular damage not only from oxygen deprivation but also from the **influx of calcium** and the generation of **oxygen free radicals** upon reperfusion.
2. **Free Radical Injury:** Mediates damage in ischemia-reperfusion, chemical injury, radiation, inflammation, and aging. Body defenses include **SOD, Catalase, Glutathione**.
3. **Coagulative Necrosis:** The most common type. Preservation of tissue architecture. Characteristic of **ischemic infarction** in all solid organs **except the brain**.
4. **Liquefactive Necrosis:** Characteristic of **brain infarction** and **pyogenic bacterial infections** (abscesses). Tissue is transformed into a liquid viscous mass.
5. **Caseous Necrosis:** A combination of coagulative and liquefactive necrosis. Associated with **tuberculosis**. Appears as **cheesy, white debris** microscopically.
6. **Fat Necrosis:** Seen in **acute pancreatitis** (release of pancreatic lipases) and **traumatic breast injury**. Saponification of fat by calcium salts creates **chalky white deposits**.
7. **Apoptosis vs. Necrosis:** Apoptosis is **programmed**, energy-dependent cell death **without inflammation**. Necrosis is **unprogrammed** cell death due to injury **with inflammation**.
8. **Cellular Adaptations:**
    a. **Hypertrophy:** Increase in cell **size** (e.g., left ventricular hypertrophy in hypertension).
    b. **Hyperplasia:** Increase in cell **number** (e.g., benign prostatic hyperplasia, endometrial hyperplasia).
    c. **Atrophy:** Decrease in cell size and number (e.g., disuse atrophy, brain atrophy in Alzheimer's).

d. **Metaplasia:** Replacement of one differentiated cell type with another (e.g., **squamous metaplasia** in bronchial airways of smokers; **Barrett esophagus** - intestinal metaplasia).

Inflammation & Repair

9. **Acute Inflammation:** Characterized by **neutrophils**, edema, and vasodilation. Major mediators: **histamine, bradykinin, leukotrienes**, and the **complement system**.
10. **Chronic Inflammation:** Characterized by **mononuclear cells** (lymphocytes, plasma cells, macrophages). Can lead to **granuloma formation**.
11. **Granuloma:** A collection of **epithelioid histiocytes** (activated macrophages), often surrounded by lymphocytes and giant cells. Caused by **persistent antigens** (e.g., TB, fungi, sarcoidosis, foreign bodies).
12. **Wound Healing Stages:**
    a. **Hemostasis:** Platelet plug.
    b. **Inflammation:** Neutrophils then macrophages.
    c. **Proliferation:** Fibroblasts (deposit collagen), angiogenesis.
    d. **Remodeling:** Collagen cross-linking and realignment.
13. **Primary Intention Healing:** Clean, surgical wound with closely approximated edges. Minimal granulation tissue and scarring.
14. **Secondary Intention Healing:** Large tissue defect with significant loss of cells and tissue. Extensive granulation tissue and scarring.

Hemodynamics

15. **Hyperemia vs. Congestion:**
    a. **Hyperemia: Active** process of increased blood flow due to arteriolar dilation (e.g., inflammation, exercise). Tissue is **red**.
    b. **Congestion: Passive** process due to impaired venous outflow (e.g., right-sided heart failure). Tissue is **blue-red** (cyanotic).
16. **Nutmeg Liver:** Central pattern of liver congestion due to **right-sided heart failure**.
17. **Pulmonary Edema:** Most common cause is **Left Ventricular Heart Failure** leading to increased hydrostatic pressure in the pulmonary capillaries.
18. **Shock:** Widespread hypoperfusion leading to cellular injury.
    a. **Septic Shock:** ↓ SVR, ↑ CO initially (warm shock).
    b. **Cardiogenic Shock:** ↓ CO, ↑ SVR.
    c. **Hypovolemic Shock:** ↓ Preload, ↑ SVR.

Neoplasia

19. **Oncogenes vs. Tumor Suppressor Genes:**
    a. **Oncogenes:** Mutated proto-oncogenes that **promote growth** (e.g., *RAS, MYC, HER2/neu*). Mutations are **dominant** (need mutation in one allele).
    b. **Tumor Suppressor Genes:** Genes that **inhibit growth** (e.g., *RB, p53, APC*). Mutations are **recessive** (classically require "two hits" - Knudson hypothesis).
20. **Carcinoma in Situ (CIS):** A pre-invasive, high-grade dysplasia involving the **full thickness of the epithelium but without invasion through the basement membrane**.
21. **Paraneoplastic Syndromes:** Remote effects of a cancer not related to direct invasion or metastasis.
    a. **SIADH:** Small cell lung cancer.
    b. **Cushing syndrome:** Small cell lung cancer (ACTH).
    c. **Hypercalcemia:** Squamous cell lung cancer, Breast cancer mets (PTHrP).
    d. **Lambert-Eaton Myasthenic Syndrome (LEMS):** Small cell lung cancer.

Genetic Disorders

22. **Autosomal Dominant: One** mutated allele causes disease. Often involves structural proteins (e.g., **Marfan syndrome - Fibrillin-1, Huntington disease, NF1**).
23. **Autosomal Recessive:** Requires **two** mutated alleles. Often involves enzyme deficiencies (e.g., **Cystic Fibrosis, PKU, Sickle Cell, Sphingolipidoses**).
24. **X-Linked Recessive:** Diseases passed through maternal carriers. **Males are affected** (e.g., **Duchenne Muscular Dystrophy, Hemophilia A & B, G6PD Deficiency**).
25. **Genomic Imprinting:** Expression of a gene depends on whether it is inherited from the mother or father.
    a. **Prader-Willi Syndrome:** Deletion on **paternal** chromosome 15 → hyperphagia, obesity, hypogonadism.
    b. **Angelman Syndrome:** Deletion on **maternal** chromosome 15 → ataxia, seizures, inappropriate laughter ("happy puppet").

Amyloidosis & Immunopathology

26. **Amyloid:** Extracellular deposition of misfolded proteins that show **apple-green birefringence** under polarized light after Congo red staining.

    a. **AL Amyloid:** Derived from immunoglobulin **Light** chains. Associated with **Plasma cell dyscrasias (e.g., Multiple Myeloma)**.
    b. **AA Amyloid:** Derived from **Serum Amyloid A** (an acute phase reactant). Associated with **Chronic Inflammatory conditions** (e.g., RA, IBD).
27. **Type I Hypersensitivity: IgE-mediated, anaphylactic** (e.g., allergies, asthma). Occurs within **minutes**.
28. **Type II Hypersensitivity: Antibody-mediated, cytotoxic** (e.g., Autoimmune hemolytic anemia, Goodpasture syndrome, Myasthenia Gravis).
29. **Type III Hypersensitivity: Immune complex-mediated** (e.g., SLE, Serum sickness, Post-strep glomerulonephritis).
30. **Type IV Hypersensitivity: T-cell mediated, delayed-type** (e.g., TB skin test, Contact dermatitis (poison ivy), Type 1 Diabetes Mellitus). Occurs in **24-48 hours**.

Physiology

Cardiovascular Physiology

1. **Cardiac Output (CO) = Heart Rate (HR) × Stroke Volume (SV).** Stroke Volume is determined by **Preload, Afterload, and Contractility**.
2. **Preload** is the ventricular wall tension at the end of diastole. It is best approximated by **Left Ventricular End-Diastolic Volume (LVEDV)**. The **Frank-Starling mechanism** states that increased preload leads to increased stroke volume.
3. **Afterload** is the wall tension the ventricle must overcome to eject blood. For the left ventricle, it is proportional to **Systemic Vascular Resistance (SVR)**. Increased afterload decreases stroke volume.
4. **Mean Arterial Pressure (MAP) = CO × SVR.** MAP is also calculated as **MAP = Diastolic BP + 1/3(Pulse Pressure)**.
5. **The Baroreceptor Reflex:** A **decrease** in BP → decreased baroreceptor firing → **increased sympathetic output** (increases HR, contractility, SVR) and **decreased parasympathetic output** (increases HR).
6. **The Valsalva Maneuver:**
    a. **Phase II (Straining):** Increased intrathoracic pressure → decreased venous return → decreased CO and BP → reflex tachycardia.
    b. **Phase IV (Release):** Sudden venous return to heart → increased CO and BP → reflex bradycardia. **Absent reflex bradycardia indicates heart failure.**

Renal Physiology

7. **Glomerular Filtration Rate (GFR)** is directly proportional to the net filtration pressure and the permeability of the capillary wall. It is **autoregulated** between a MAP of ~80-180 mmHg via **myogenic mechanism** and **tubuloglomerular feedback**.
8. **The Juxtaglomerular (JG) Apparatus** consists of the **macula densa** (senses NaCl in distal tubule) and **JG cells** (release renin).
9. **Renin-Angiotensin-Aldosterone System (RAAS):**
    a. **Renin release** is stimulated by: 1) ↓ Renal perfusion pressure, 2) ↓ NaCl delivery to macula densa, 3) β1-adrenergic stimulation.
    b. **Angiotensin II** causes vasoconstriction (↑ SVR) and stimulates aldosterone release.
    c. **Aldosterone** acts on the principal cells of the collecting duct to **reabsorb Na^+ and water** and **secrete K^+ and H^+**.
10. **Countercurrent Multiplier System:** Creates a hyperosmotic renal medulla for water reabsorption. The **thick ascending limb** is **impermeable to water** but actively reabsorbs NaCl, diluting the filtrate.
11. **Atrial Natriuretic Peptide (ANP):** Released from atrial myocytes in response to stretch (high blood volume). Causes **vasodilation, increased GFR, and natriuresis** (increased sodium excretion), thereby **decreasing** blood volume and BP.

Respiratory Physiology

12. **The Oxygen-Hemoglobin Dissociation Curve** is **sigmoidal**. Factors causing a **Right Shift** (↓ affinity, ↑ O_2 delivery to tissues) are: **↑ CO_2, ↑ H^+ (↓ pH), ↑ Temperature, ↑ 2,3-BPG**.
13. **V/Q Mismatch** is the most common cause of **hypoxemia**. A **shunt** is an extreme V/Q mismatch where V/Q = 0 (blood passes alveoli without gas exchange). It causes hypoxemia that **does not improve with 100% O_2**.
14. **CO_2 Transport:** The majority of CO_2 in blood is transported as **bicarbonate (HCO_3^-)** via the **chloride shift** in RBCs. The **Haldane Effect:** Deoxygenated blood has a greater capacity to carry CO_2.
15. **Control of Breathing:** The primary central chemoreceptors in the medulla are sensitive to **changes in CSF pH**, which is primarily influenced by **$PaCO_2$**.

Gastrointestinal Physiology

16. **Gastric Acid Secretion: Parietal cells** secrete H^+ via **H^+/K^+ ATPase (proton pump)**. They are stimulated by **ACh (vagus), Gastrin, and Histamine**.
17. **Intrinsic Factor** is secreted by **parietal cells** and is essential for **Vitamin B12 absorption in the terminal ileum**.
18. **Fat Absorption:** Products of fat digestion are incorporated into **micelles** for absorption. Inside enterocytes, they are re-esterified and packaged into **chylomicrons**, which enter the **lymphatics (lacteals)**.
19. **GI Hormones:**
    a. **Gastrin:** ↑ Gastric acid secretion.
    b. **Secretin:** ↑ Pancreatic HCO_3^- secretion, ↓ Gastric acid.
    c. **Cholecystokinin (CCK):** ↑ Gallbladder contraction, ↑ Pancreatic enzyme secretion, ↓ Gastric emptying.

Endocrine Physiology

20. **Hypothalamic-Pituitary Axis:** The hypothalamus releases **releasing hormones** that stimulate the anterior pituitary to release **trophic hormones** (e.g., TRH → TSH; CRH → ACTH; GnRH → FSH/LH).
21. **Thyroid Hormone Synthesis:** Requires **iodine** and involves **organification** (binding iodine to tyrosine residues on thyroglobulin), **coupling**, and release. **Thyroid-Stimulating Hormone (TSH)** upregulates every step.
22. **Insulin vs. Glucagon:**
    a. **Insulin** (from pancreatic β-cells) is a **fed-state** hormone. It promotes **glycogen, fat, and protein synthesis**.
    b. **Glucagon** (from pancreatic α-cells) is a **fasting-state** hormone. It promotes **glycogenolysis, gluconeogenesis, and lipolysis**.
23. **Cortisol:** A glucocorticoid released in response to stress (via the HPA axis). It causes **peripheral insulin resistance, gluconeogenesis, and protein catabolism**.

Neuromuscular Physiology

24. **The Neuromuscular Junction (NMJ):** Acetylcholine (ACh) binds to **nicotinic receptors** on the motor end plate, causing an influx of Na^+ and generating an **end-plate potential (EPP)**.

25. **Muscle Contraction:** The **action potential** travels down the T-tubule, triggering **Ca^{2+} release from the sarcoplasmic reticulum**. Ca^{2+} binds **troponin C**, moving tropomyosin and allowing **myosin to bind actin** (cross-bridge cycling).
26. **Smooth Muscle Contraction:** Initiated by **Ca^{2+} binding to calmodulin**, which activates **myosin light-chain kinase (MLCK)** to phosphorylate myosin.

Blood & Acid-Base

27. **The Anion Gap = $[Na^+]$ - ($[Cl^-]$ + $[HCO_3^-]$)**. A **high anion gap metabolic acidosis** is caused by the accumulation of unmeasured anions (e.g., lactate, ketones, uremic acids, toxins). Remember **MUDPILES**.
28. **Compensation for Acid-Base Disorders:**
    a. **Metabolic Acidosis:** Respiratory compensation → **hyperventilation** (↓ $PaCO_2$).
    b. **Metabolic Alkalosis:** Respiratory compensation → **hypoventilation** (↑ $PaCO_2$).
    c. The **Winter's Formula** estimates expected $PaCO_2$ in metabolic acidosis: **Expected $PaCO_2$ = 1.5$[HCO_3^-]$ + 8 ± 2**.

Miscellaneous High-Yield

29. **Autoregulation of Blood Flow:** The **heart, brain, and kidneys** autoregulate their blood flow to maintain constant perfusion despite changes in MAP.
30. **Starling Forces** govern fluid movement across capillaries: **Hydrostatic pressure** pushes fluid out, **oncotic pressure** pulls fluid in. **Net filtration** occurs at the **arteriolar end**, and **net reabsorption** occurs at the **venular end** of a capillary.